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PNEUMONIA

A Symposium on the Occurrence, Etiology, Diagnosis, Prognosis and Treatment of Pneumonia

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H. EDWIN LEWIS, M. D.

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INTRODUCTION.

SOME REMARKS ON THE HISTORY AND OCCURRENCE OF PNEUMONIA, WITH BRIEF STATISTICAL DATA.

BY
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New York City.

There can be no doubt that pneumonia has been known since earliest times. The writings of the ancient physicians from Hippocrates down bear witness to the fact that this disease is as old as civilization itself. Among the laity, it has likewise long been a recognized affliction, and as the dreaded "lung fever," it has been looked upon since time immemorial as one of mankind's most fearful curses.

Lack of space forbids any lengthy discussion of the history of pneumonia, although it would well pay anyone to delve into the bygone literature of the subject and study the interesting evolution of opinion concerning pathology and treatment.

According to Musser and Norris, the relation between the clinical manifestation

47293

of pneumonia and consolidation of the lungs was first pointed out by Morgagni; while Baillie first described the process as "hepatization." Subsequent studies of great importance were made by Laennec, Cruveilhier and Rokitansky. The actual diagnosis of pneumonia by determining its physical signs was first described by Auenbrugger and Laennec, while to Rokitansky belongs the credit of first differentiating between lobar and lobular types.

Occurrence: Pneumonia is world-wide in its occurrence. The people of some countries seem rather less prone to the ravages of this disease—notably those near the equator—but none escape it entirely. Emigration seems to rob individuals of any immunity they may have established in their native climes, and in the country of their adoption they often become much more susceptible. This opens up a most interesting line of thought concerning bacterial virulence and there can be little doubt that the pneumococcus is an organism particularly subject to environal modification. This fact taken into consideration with the great variability of human susceptibility makes it extremely difficult to establish any fixed data as to the occurrence of pneumonia. The factors of the equation presented by bacterial virulence and human susceptibility

are so subject to modification that the most we can do is to study percentages and realize that such figures at best give us but approximate truths.

All available statistics point to the fact that pneumonia is increasing. Especially does this seem to be so in certain localities, as for instance in Chicago. During the last forty years the mortality from pneumonia has increased from 4.4 to 19.95 per 10,000 inhabitants.

The last U. S. Census shows that pneumonia next to tuberculosis is responsible for a larger number of deaths each year than any other disease. While the mortality of tuberculosis seems to be decreasing, pneumonia goes steadily onward, and probably the day is not far distant when pneumonia will head the list of causes of death. There are not a few physicians who question the foregoing and attribute the increase of pneumonia deaths to errors of diagnosis, but there are abundant reasons for believing that the diagnosis of pulmonary diseases and the registration of deaths are far more accurate to-day than formerly.

The increase in pneumonia deaths may rightly be considered, therefore, as a reliable index of the spread of this disease that Osler aptly terms the "Captain of the Men of Death."

As a matter of statistical interest the following tables have been selected from the latest edition of Osler's *System of Medicine,* (1909).

THE OCCURRENCE BY MONTHS.

The records collected by Wells of 685,566 fatal cases show:

Month.	Cases.	Per cent.
January	83,151	12.1
February	86,090	12.5
March	89,062	13.0
April	89,263	13.0
May	67,028	9.9
June	38,861	5.7
July	26,059	3.8
August	24,811	3.6
September	27,183	4.0
October	38,111	5.7
November	50,260	7.3
December	65,667	9.6

PNEUMONIA IN ITS RELATION TO AGE.

Among 32,681 cases:

Age.	Cases.	Per cent.
0 to 5 years	1,249	3.8
5 to 10 years	3,132	9.6
10 to 20 years	5,107	15.6
20 to 30 years	8,041	24.6
30 to 40 years	5,665	17.3
40 to 50 years	3,987	12.2
50 to 60 years	2,558	7.8
60 to 70 years	1,754	5.4
Over 70	1,094	3.3
The age was not stated	94	0.3

PNEUMONIA IN ITS RELATION TO SEX.

Of 12,098 cases collected by the writers, 8,881, or 73.41 per cent., occurred in males and 3,217, or 26.59 per cent., in females.

The various relations of incidence to sex and age are shown in the following tables:

MALES.

Age.	Cases.	Per cent.
0 to 5 years	35	0.39
5 to 10 years	57	0.64
10 to 20 years	2,197	24.74
20 to 30 years	2,912	32.79
30 to 40 years	1,582	17.81
40 to 50 years	1,117	12.58
50 to 60 years	593	6.68
60 to 70 years	310	3.49
Over 70	78	0.88
	8,881	

FEMALES.

Age.	Cases.	Per cent.
0 to 5 years	22	0.68
5 to 10 years	37	1.15
10 to 20 years	456	14.18
20 to 30 years	853	26.51
30 to 40 years	542	16.85
40 to 50 years	425	13.21
50 to 60 years	403	12.53
60 to 70 years	319	9.92
Over 70	160	4.97
	3,217	

PNEUMONIA IN ITS RELATION TO OCCUPATION.

The influence of occupation upon the frequency of pneumonia is shown by the mortality statistics of the United States census, 1900.

PERCENTAGE OF ALL DEATHS DUE TO PNEUMONIA.

Males.	Whites.	Negroes.
Professional	8.7	11.8
Clerical and official	9.2	6.6
Mercantile and trading	9.4	13.5
Public entertainment	9.9	18.7
Personal service, police and mili-		

tary	9.9	11.9
Laboring and servant	11.8	11.7
Manufacturing and mechanical industries	9.8	10.2
Agricultural, transportation, and other outdoor	10.7	13.8
All others	8.3	12.5
Females.		
Musicians and music teachers	5.2	
School teachers	7.4	8.8
Stenographers and typewriters	6.0	
Bookkeepers, clerks, copyists	13.0	
Hotel and boarding-house keepers	5.0	4.
Laundresses	10.3	8.1
Nurses and midwives	10.1	9.4
Males.		
Servants	9.5	8.3
Cigar makers and tobacco workers	12.2	
Mill and factory operatives—textiles	9.8	6.0
Milliners	5.6	5.2
Dressmakers and seamstresses	8.0	7.2
Telegraph operators	8.6	
All others	9.5	8.8

THE DAY OF CRISIS.

Among 10,159 cases of pneumonia collected by the writers, the disease terminated by crisis in 5,397, or 53.1 per cent. The day of the disease upon which crisis occurred was as follows in 4,718 cases:

Day of Crisis.	Number.	Percentage.
First	1	0.02
Second	27	0.6
Third	183	3.8
Fourth	265	5.5
Fifth	760	15.9
Sixth	681	14.2
Seventh	1,042	21.7
Eighth	629	13.1
Ninth	505	10.5
Tenth	250	5.2
Eleventh	179	3.7
Twelfth	63	1.3
Thirteenth	70	1.4
Fourteenth	17	0.3

Fifteenth	21	0.4
Sixteenth	15	0.3
Seventeenth	10	0.2

Of 5,201 crises, 3,050, or 58.6 per cent. occurred on the odd days and 2,151, or 41.4 percent., occurred on the even days.

THE DAY OF DEATH.

The following tabulation shows the day of the disease upon which death occurred in 2,613 collected cases:

Day of Death.	Number.	Per cent.
First	6	0.23
Second	60	2.30
Third	95	3.64
Fourth	124	4.75
Fifth	189	7.23
Sixth	209	8.00
Seventh	230	8.80
Eighth	225	8.61
Ninth	206	7.88
Tenth	175	6.70
Eleventh	125	4.78
Twelfth	93	3.56
Thirteenth	60	2.30
Fourteenth	82	3.14
Fifteenth	53	2.03
Sixteenth	41	1.57
Seventeenth	41	1.57
Eighteenth	33	1.26
Nineteenth	37	1.42
Twentieth	25	0.96
Twenty-first	59	2.26
Later	445	17.03

One thing is certain and that is that few diseases are of greater importance to the general practitioner than pneumonia. The unexpected character of its attack, its insidious onset, its rapid placing of a patient, no matter how stalwart, in a state of gravest peril, and the uncertainty of the prognosis until the crisis is well passed, all serve

to make pneumonia a disease of the most serious possible character. Such a scourge that robs us gluttonly of our young and old, weak and strong, rich and poor needs our best thought and study. Mankind cannot remain supine much longer and allow this fearful disease to go on taking annually its unwarranted toll.

It was with the earnest belief that every bit of thought given to the question of pneumonia has a potential if not an active value, and may sometime lead, when least expected, to the ultimate solution of this great medical problem, that this symposium was arranged.

Such an array of opinions and ideas—and from the sources represented—cannot fail to prove of incalculable value to the general practitioner. It is the last word on pneumonia—and if, aside from the facts and ideas it outlines for practical use, it serves ever so little to stimulate further investigation of this at present blot on the medical escutcheon, the time and effort expended in its compilation will be well repaid.

THE DIFFERENTIAL DIAGNOSIS OF LOBAR PNEUMONIA.

BY

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INTRODUCTORY.

The symptom-complex constituting lobar pneumonia is quite characteristic; the recognition of the affection—provided the case has been under observation from the onset—is hardly ever attended by any difficulty. Occasional delay in arriving at a conclusive diagnosis may ensue in such instances of the disease which have not been under medical supervision from the start and do not give a thoroughly reliable history; however, on the hand of the physical signs together with the special objective phenomena chancing to be present at the time, a positive diagnosis will soon be established in the overwhelming majority of the cases.

The fact, furthermore, must not be lost sight of that the classical syndrome of lobar pneumonia is not always present in its entirety. One or the other of the typical local or general symptoms or physical signs may be illy developed or be absent altogether; in one-fifth of the cases the initial rigor has never occurred; the pain, depending almost entirely upon the degree

of associated pleural involvement, may be a negligible factor when the process is a deep-seated one; a mild temperature elevation may be out of proportion to the severity of the case; even the characteristic pulse-respiration ratio may be entirely wanting. The physical signs may fail if the pneumonic process has not progressed towards the periphery of the lung, if there prevails an additional intrathoracic disease or if there exists a much thickened pleura.

Certain cases of pneumonia are apt to be mistaken for one or the other pathological condition which is not localized in the thoracic cavity. This may especially occur with typhoid fever and meningitis.

Symptoms analogous to those of the typhoid state—dry tongue, rapid pulse, feeble heart action, diarrhea, great weakness, etc. —may prevail in protracted cases of lobar pneumonia. If a case has not been under observation prior to the occurrence of this condition, which is known as typhoid pneumonia, it may be at times a difficult task to ascertain its real character. If in such a case a careful physical examination does not point to the lung as the seat of the affection the application of the Widal test will clear the diagnosis in well-nigh every instance. Again, there occur cases of typhoid fever—pneumo typhoid—the inaugural symptoms of which more or less re-

semble those of lobar pneumonia. The positive Widal reaction points to typhoid fever as does the characteristic eruption which usually appears on or about the eighth day.

In children particularly, lobar pneumonia may be mistaken for meningitis. A careful physical examination, however, will often demonstrate the presence of pneumonia. Cytologic study of the spinal fluid may determine the occurrence of meningitis. Convulsions may occur in pneumonia as well as in meningitis; in small children, however, pneumonia is frequently ushered in with a convulsion while this commonly ensues somewhat later in meningitis. Headache in pneumonia is frontal, in meningitis it is occipital and accompanied by painful retractions of the muscles of the neck. Absence of Kernig's sign in pneumonia, nonoccurrence of a crisis in meningitis, and the presence of the characteristic pulse-respiratory phenomenon will assist in making the differential diagnosis.

In the presence of chronic alcoholism violent mental manifestations may entirely overshadow the local condition. On the hand of the physical signs and the objective symptoms a conclusive diagnosis of lobar pneumonia should be established within a few hours after its onset in the chronic drunkard. Again, an acute pneumonic

process, remaining often unrecognized, is frequently the terminal affection of many a chronic disease; the association of fever and cough superimposed upon a chronic glycosuric, nephritic or cardiopathic state should invariably prompt a thorough examination of the lungs. The differential diagnosis between the manifestations of the chronic and those of the acute complicating process is possible in a goodly proportion of the cases.

The differential diagnosis of lobar pneumonia is almost entirely confined to the latter's differentiation from other acute diseases of the lungs or from those of the pleura during the course of which there ensues pulmonary dulness. A study of the differential diagnosis of lobar pneumonia should therefore comprise not only diseases like acute pneumonic phthisis, bronchopneumonia, pleurisy with effusion and hemorrhagic infarct, but also affections of possibly less acuity, as hydrothorax, pneumothorax, atelectasis and hypostatic pneumonia, which are characterized by dulness most frequently elicited over the lower lung portions. In the following the various diseases are analyzed on the hand of their physical signs and symptomatology.

INSPECTION, MENSURATION.

Lobar Pneumonia. Intercostal spaces usually remain unchanged; more or less diminished movement on affected side; increased expansive motions of chest on sound side; pulsation of diseased lung apt to give rise to distinct movement of chest wall; little or no increase in volume of affected side.

Acute Pneumonic Phthisis. Rapid respiratory movements; nothing pathognomonic.

Acute Pleurisy with Effusion. Intercostal spaces obliterated or bulging on affected side; increase of circumference noticeable in many cases; respiratory sluggishness in diseased area; in effusion of right side displacement of apex beat to left, in effusion of left side displacement to the right or obliteration.

Broncho-Pneumonia. Nothing characteristic.

Hemorrhagic Infarct. Nothing characteristic.

Hydrothorax. Intercostal spaces never bulging; usually no thoracic enlargement.

Pneumothorax. Conspicuous enlargement and immobility of affected side; intercostal spaces distended and bulging; apex beat obliterated in affection of left side, displaced to left in affection of right side; patient lies on affected side.

Atelectasis. During inspiration often retraction over affected area.

Hypostatic Pneumonia. Nothing characteristic.

PALPATION.

Lobar Pneumonia. Vocal fremitus generally increased over area of dulness; pressure sensitiveness of intercostal spaces on affected side.

Acute Pneumonic Phthisis. Occasionally bronchial fremitus; vocal fremitus decreased when accompanied by pleurisy.

Acute Pleurisy with Effusion. Vocal fremitus over area of dulness decreased or abolished; when pulmonary and costal pleura are connected by adhesions vocal fremitus may be obtained.

Broncho-Pneumonia. Impaired expansion; increased tactile fremitus over larger consolidated areas.

Hemorrhagic Infarct. Pressure sensitiveness over area of dulness; vocal fremitus may be increased.

Hydrothorax. Vocal fremitus over area of dulness decreased or absent.

Pneumothorax. Vocal fremitus absent over area of dulness, decreased above the latter.

Atelectasis. Tactile fremitus generally decreased.

Hypostatic Pneumonia. Vocal fremitus increased over area of dulness.

PERCUSSION.

Lobar Pneumonia. Stage of engorgement: Percussion note generally higher pitched, often tympanitic. Stage of hepatization: Percussion note dull, ranging from sound of more or less tympanitic timbre to decided flatness; dulness has not character

of wooden flatness of effusion; sense of resistance not so great as in pleurisy with effusion. Stage of resolution: Dulness subsides; percussion note at first somewhat tympanitic, may remain higher pitched over affected side for some time.

Acute Pneumonic Phthisis. Impaired percussion note or dulness as a rule; in some cases hyper-resonance.

Acute Pleurisy with Effusion. Dulness over accumulated effusion; its degree depends upon amount of effusion and displacement of lung from costal pleura; dulness begins over posterior and inferior portions of lung and ascends in accordance with increase of effusion. Effusions amounting to less than 300 cc. are not demonstrable by percussion. Intensity of dulness and sense of resistance when percussing increased downwardly; limit of dulness higher in sitting than in recumbent posture; when effusion is copious cracket-pot sound may be educed below clavicle; if pleural cavity is partly filled with exudation line of dulness changes when occupying different position.

Broncho-Pneumonia. Small, circumscribed areas of dulness, often bilateral; dulness not marked and often demonstrable by slight percussion only; often it is diffuse exhibiting some tympanitic quality, especially over lower lobes.

Hemorrhagic Infarct. Circumscribed dulness of slight intensity, mostly over lower lobe and unilateral.

Hydrothorax. Dulness over accumulated liquid, mostly bilateral; line of dulness ascends and descends during respiration; when unilateral dulness is usually elicited over right side.

Pneumothorax. Percussion note deep and full or flat tympanitic in some cases, in others dull; dulness over effusion at base changing outline with postural change of patient; movable dulness more readily elicited than in pleurisy.

Atelectasis. Irregular, not sharply circumscribed area of dulness when condition is extensive, tympanitic sound when incomplete or slight; postural change of patient and deep inspiration cause disappearance of dulness or tympany.

Hypostatic Pneumonia. At onset abbreviated percussion note with tympanitic timbre behind, below or lateral; later dulness, absolute below, gradually clearing upwards.

AUSCULTATION.

Lobar Pneumonia. Stage of engorgement: Weak respiratory sounds in affected part, exaggerated breathing over healthy portions; occasionally broncho-vesicular sounds on full inspiration; at end of deep inspiration fine crepitant râle. Stage of hepatization: When dulness is marked low-pitched bronchial or tubular breathing, heard first with expiration; crepitant râle at end of inspiration best audible at beginning of consolidation; subcrepitant râles are due to accompanying bronchitis; tubular breathing absent in certain cases of massive pneumonia; occasional friction-sounds. Stage of resolution: Subcrepitant râles audible on inspiration and expiration, coarser râles over bronchi; broncho-vesicular breathing followed by normal respiratory sounds.—Auscultation of voice elicits normal transmission (bronchophony), occasionally in-

creased transmission (pectoriloquy), rarely bleating character (egophony).

Acute Pneumonic Phthisis. Sibilant and coarse or small, fine, crepitant, dry or moist râles; in children occasionally high-pitched tubular breathing at bases of lung.

Acute Pleurisy with Effusion. Weakened vesicular breathing in presence of slight effusion; breathing sounds inaudible in presence of considerable effusion; distinct bronchial breathing, best audible near spine when lung is compressed and layer of exudate between lung and chest-wall is moderate; bronchial breathing, in contradistinction to pneumonia, least audible over area of marked dulness, i. e. at base of effusion. Leathery friction rub at onset of affection prior to accumulation of effusion, later frequently over upper level of exudate. —Vocal resonance diminished or absent; occasionally egophony; whispered voice transmitted through serous, not through purulent exudate (Baccelli's sign).

Broncho-Pneumonia. Over areas of dulness, fine, subcrepitant râles, often bilateral; respiratory murmur bronchial or bronchovesicular; also manifestations of bronchiolitis.—Bronchophony over larger areas of dulness.

Hemorrhagic Infarct. Bronchial breathing, moist râles; occasionally pleuritic friction.

Hydrothorax. Respiratory murmur over dulness weakened or absent, occasionally bronchial between scapulae; friction sounds only when complicated with pleurisy.—Vocal resonance sometimes egophonic over boundary line of dulness.

Pneumothorax. Respiratory murmur over diseased side weakened or absent; amphoric breathing in presence of open pneumothorax, exaggerated breath-sounds on healthy side; metallic quality of râles; metallic tinkling on coughing or deep inspiration. Hippocratic succussion elicited in most cases (production of metallic splashing sound by shaking patient's body); coin sound characteristic of condition.

Atelectasis. When incomplete, vesicular murmur diminished or absent; when involved area is large, bronchial respiration; subcrepitant râles on deep inspiration.—Bronchophony as a rule.

Hypostatic Pneumonia. At onset diminished vesicular murmur low posteriorily; fine vesicular râles, bronchial respiration and frequently tinkling râles when dulness increases.

CONCURRING DISPLACEMENT OF HEART AND LIVER.

Lobar Pneumonia. No or no marked displacement of either organ.

Acute Pneumonic Phthisis. No displacement of either organ unless accompanied by pleurisy with effusion.

Acute Pleurisy with Effusion. When exudate is on right side heart is displaced to left, liver, especially right lobe, downward so that it is readily palpable; when exudate is on left side heart is displaced to right.

Broncho-Pneumonia. No displacement of either organ.

Hemorrhagic Infarct. No displacement of either organ.

Hydrothorax. No cardiac displacement in bilateral hydrothorax; liver frequently displaced downward.

Pneumothorax. When left side is affected ordinarily absence of dulness in normal cardiac area, especially when patient is in recumbent position; spleen dislocated downward; in disease of right side heart pushed toward left, liver downward.

Atelectasis. No displacement of either organ.

Hypostatic Pneumonia. No displacement of either organ.

TEMPERATURE.

Lobar Pneumonia. Sudden initial chill, temperature rising to 104 deg. or 105 deg. F. in 8 to 12 hours; assumes then continued form, nocturnal remissions of 1 deg. or more; in weakened persons, advanced age, alcoholism lower average temperature. During pseudo crisis marked temperature decline followed by renewed elevation; crisis usually between 5th and 11th day, temperature falling during night; post-critical temperature often subnormal.

Acute Pneumonic Phthisis. Rapidly rises to 104 deg. or 105 deg. F.; continued type, or soon remittent or hectic with night-sweats. Onset in other cases with repeated chills, followed by high and irregular fever; no crisis.

Acute Pleurisy with Effusion. Rises slowly to 101.5 deg. to 103 deg. F.; after from 1 to 3 weeks declines by lysis, never by crisis; in most acute cases assumes con-

tinued character; surface temperature 1 to 2 degrees higher on affected than on healthy side.

Broncho-Pneumonia. Abrupt or gradual increase to 102 deg. to 104 deg. F.; fever irregular, in severe cases continued; declines by lysis.

Hemorrhagic Infarct. Chills and fever frequently at onset; no temperature elevation later on, as a rule; increase or continuation of initial fever due to septic processes.

Hydrothorax. Usually no elevation.

Pneumothorax. Depending upon primary disease; at onset often subnormal; increases when exudate is produced.

Atelectasis. Dependent upon primary disease.

Hypostatic Pneumonia. No characteristic temperature range; depending entirely upon primary disease.

PULSE.

Lobar Pneumonia. Pulse-rate 100 to 116 per minute in moderately severe cases; greater frequency denotes danger; at first small, later full and bounding; rarely dicrotic; with extensive consolidation pulse may be small and rapid; in old and weak patients may be small and frequent from outset.

Acute Pneumonic Phthisis. During first week frequently as in lobar pneumonia; later small and rapid.

Acute Pleurisy with Effusion. Pulse-rate 100 or more per minute; volume and tension reduced; occasionally irregularity of rhythm.

Broncho-Pneumonia. Pulse-rate very frequent; compressible; in later stages often extremely rapid, feeble and arrhythmic.

Hemorrhagic Infarct. Small and frequent.

Hydrothorax. Feeble.

Pneumothorax. Small, compressible, accelerated.

Atelectasis. Small, feeble, accelerated.

Hypostatic Pneumonia. Small, accelerated.

SPUTUM.

Lobar Pneumonia. At first scanty, colorless and frothy, soon attains characteristic rusty or prune juice color; viscid and very tenacious, difficult to eject by patient; adherent to receptacle; more profuse, also purulent, easier expelled at period of crisis; may be absent in children and old people. Contains often fibrin clots; microscopically consists of red and white blood cells, mucous and pus corpuscles, bronchial and alveolar epithelium, blood pigment, small cell casts of alveoli, fibrinous casts of bronchioles; of microorganisms, pneumococcus generally, micrococcus lanceolatus and influenza bacillus occasionally present.

Acute Pneumonic Phthisis. At first mucoid, then rusty-colored; later more abundant, muco-purulent, greenish or bluish-yellow; contains tubercle bacilli and shreds of yellow elastic tissue.

Acute Pleurisy with Effusion. Frequently no expectoration; mucous excretion during process of resorption; if abundant generally due to concurring bronchitis or pulmonary tuberculosis.

Broncho-Pneumonia. Glairy and tenacious mucus ordinarily, occasionally mucopurulent and rather turbid; in adults may be blood-tinged; never rusty.

Hemorrhagic Infarct. Bloody, dark-colored, mucoid expectoration appearing suddenly.

Hydrothorax. Only in presence of complications.

Pneumothorax. Character of expectoration dependent upon primary disease (tuberculosis, gangrene, abseess, etc.).

Atelectasis. Dependent upon primary disease.

Hypostatic Pneumonia. Mucoid, mucopurulent or, on account of complications, reddish-brown, or frothy and reddish, or bloody.

SUBJECTIVE SYMPTOMS.

Lobar Pneumonia. Sharp *pain* in affected side soon after initial chill lasting two to three days; commonly referred to region of nipple or axilla, occasionally to abdomen when appendicitis may be suspected; cough or deep inspiration aggravating it; absent in old people and in central pneumonia. Patient lies generally on healthy side.

Cough frequent, short, repressed, associated with increased pain; may be absent in old people and alcoholics.

Dyspnea nearly always present; respirations in adults from 40 to 60, in children from 60 to 100 per minute, shallow, brief inspiration as well as expiration; expiration often attended by audible grunt.

Headache occurs early, may be present throughout.

Acute Pneumonic Phthisis. *Pain* in side.

Dyspnea supervenes early; respiration may soon be very labored.

Cough invariably present; aggravates pain.

Acute Pleurisy with Effusion. *Pain* usually sets in with febrile state; may not occur until some hours after onset of affection; is sharp, lancinating or dragging, aggravated by cough; its intensity no positive indication of severity of affection; commonly referred to nipple or axillary regions, not infrequently to abdomen or low down in back; diminishes as effusion appears; at start patient lies upon healthy side, later upon affected side.

Cough occurs early; not as frequent or distressing as in pneumonia; may be absent in certain cases; increased during resorption of exudate.

Dyspnea most pronounced when effusion develops rapidly; breathing frequent and shallow; when effusion accumulates slowly dyspnea may be absent except on exertion.

Broncho-Pneumonia. *Pain* in affected side, gradual onset.

Cough hard, distressing, often painful, accompanied by expectoration.

Dyspnea constant and progressive; respiration rises to 50 or even 80 per minute.

Hemorrhagic Infarct. Sudden appearance of lancinating *pain* in one side.

Dyspnea supervenes with pain or even earlier; extremely distressing; struggle at breathing; mental anxiety.

Sudden spells of *cough.*

Hydrothorax. *Pain* absent.

Dyspnea marked and constant, often orthopnea; asthmatic attacks.

Cough irritative, invariably present at some period.

Pneumothorax. *Pain* agonizing, appears suddenly at site of collected air in pleural sac; high degree of oppression.

Dyspnea extreme, often attended by feeling of impending suffocation; frequent respirations.

Atelectasis. Nothing characteristic.

Hypostatic Pneumonia. No definite *pain;* oppression and sense of compression in thorax.

Impaired respiration.

DURATION.

Lobar Pneumonia. Without complications generally not longer than eleven days.

Acute Pneumonic Phthisis. Usually terminates fatally in from two to six weeks; some cases not before third month.

Acute Pleurisy with Effusion. Longer than pneumonia; febrile period one to three weeks; stage of absorption widely varying duration.

Broncho-Pneumonia. Considerable variation; fatal cases two to three weeks or less; cases recovering after from six to

eight weeks, occasionally one to three weeks only.

Hemorrhagic Infarct. Generally very brief, terminating lethally; at other times dependent upon resulting processes.

Hydrothorax. Depends upon character of primary disorder.

Pneumothorax. Depends mostly upon cause; tuberculous cases generally die within few weeks, occasionally even within first day; recovery at widely varying periods; chronic condition may continue for three or four years.

Atelectasis. Very uncertain.

Hypostatic Pneumonia. Depends upon character of associated condition.

ETIOLOGICAL DATA.

Lobar Pneumonia. Primary form "colds" and infection (mostly micrococcus lanceolatus of Fränkel); traumatism; more frequent in males; alcoholism predisposes. Secondary form in typhoid fever, influenza, measles.

Acute Pneumonic Phthisis. Rapid infection; secondary form following localized pulmonary tuberculosis, tuberculosis of pleura, peritoneum or any other organ; much more frequently in males.

Acute Pleurisy with Effusion. Primary form exposure to cold or wet; traumatism; primary tuberculosis of pleura. Secondary form (the most frequent) pulmonary tuberculosis; pneumonia; pulmonary abscess or gangrene; affections of osseous structures of thorax; diseases of mediastinum,

bronchial glands, esophagus, abdominal viscera, metabolism.

Broncho-Pneumonia. Primary form (mostly in adults) same causes as of pneumonia. Secondary form (the most frequent) following or associated with measles, scarlet fever, influenza, whooping-cough, diphtheria, tuberculosis; aspiration (deglutition) pneumonia.

Hemorrhagic Infarct. Result of stasis in presence of feeble circulation in pulmonary capillaries; thrombus in right heart (dilatation); mitral disease; venous thrombosis.

Hydrothorax. Manifestations of general dropsy in diseases of heart, lungs, liver, kidney and in marasmatic conditions.

Pneumothorax. Tuberculosis; bronchitis; empyema; malignant disease or abscess of esophagus; malignant or ulcerative disease of stomach or colon; bronchiectasis; perforating chest lesions.

Atelectasis. Compression of lungs by pleural or pericardial effusion; hydro- or pneumothorax; tumors, aneurysm of arch; paralysis of pneumogastric; paralysis of chest walls; thoracic deformities; marasmatic conditions.

Hypostatic Pneumonia. Constant recumbent or lateral posture in presence of cardiac weakness due to febrile affections; marasmus; bone fractures (old people).

250 West 73rd Street.

THE SYMPTOMATOLOGY, COMPLICATIONS AND PROGNOSIS OF PNEUMONIA IN CHILDREN.[1]

BY
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In considering the symptomatology of pneumonia in children we must differentiate between the two principal clinical varieties of these affections, namely, lobar and broncho-pneumonia. Lobar pneumonia, is, according to our modern view, a general infection with localization of the inflammatory process in the lung tissue, whereas broncho-pneumonia is usually the extension of an inflammatory process from the upper respiratory tract into the bronchioles, alveoli, and adjacent tissues. In accordance with this difference in the pathological anatomy of the two diseases we find a distinct difference in the symptomatology.

The onset of lobar pneumonia in children is sudden as in adults. The disease is commonly at this period of life ushered in by high fever, vomiting, cyanosis or convulsions. The pathognomonic chill of the adult is replaced in children by cyanosis or convulsions. Within a short time of the onset we find a change in the pulse respiration ratio, which gives us the first

[1] Read before the Eastern Medical Society.

indication of pulmonary involvement. Normally this ratio is about 1 to 4, that is 1 respiratory movement to 4 pulse beats, whereas in pneumonia this ratio becomes changed to 1 to 3 or even to 1 to 2, so that with a pulse of 150, we may have respirations of 50 to 75. The temperature is as a rule of a continuous type running from 103 to 106 F. With this is usually associated the movement of the alae nasi, with respirations, and the well-known and characteristic expiratory grunt. One who is accustomed to see lobar pneumonia in adults, in which the condition can be often readily recognized at a glance, will not infrequently overlook this affection in children, on account of the absence of dyspnoea and cough in not a few of the cases. The difficulty is enhanced by the late appearance of the physical signs. The time when these signs become demonstrable depends chiefly on the original site of the lesion, whether peripheral or central. In the peripheral pneumonia we can usually detect changes in the chest within 24 to 36 hours from the onset, whereas in a centrally located pneumonia signs of consolidation may not make their appearance before 3 to 5 days, or even longer. The earliest change is usually in the auscultation. The puerile breathing over the affected part becomes diminished or lost and the respiratory murmur is faint.

The next change is in the voice and at this stage is the most characteristic and almost pathognomonic sign. When a child cries, coughs or is made to say moo, its name, the usual 99 or 1, 2, 3; you will detect a distinct increase in the vocal fremitus and also a change in its quality, that is, it acquires a nasal quality, the so-called bronchophony. The breathing soon loses its vesicular character and becomes bronchial in type. On percussion we at first elicit a hyperresonant note which soon becomes dull. If the consolidation is in the neighborhood of a large bronchus, we obtain on percussion a tympanitic note, the so-called Skodaic resonance. Fine crepitant rales are usually heard over the area of consolidation, but are by no means as frequent or constant as in the adult. Promptness in the early detection of these signs, demands frequent and careful examinations of the chest and especially of certain regions, where these signs usually make their earliest appearance. These areas are the supra and intraclavicular regions, upper axillae, and the bases of the lungs. It is important to recognize the existence in the child of certain normal variations in the physical signs of the chest, which might confuse the physician in his examination. In not a few children the auscultatory murmur over the right apex possesses normally

a broncho-vesicular type. Posteriorly over the right base we often find a distinct dulness due to the situation of the liver and also to the overlapping of the middle and lower lobes of the lung. To diagnosticate the existence of pulmonary consolidation in these regions we must not only have dulness or change in auscultatory signs, but also change in the voice or the existence of fine crepitant rales. The usual duration of the fever is five to nine days and as in the adult falls by crisis, in the majority of the cases. However in some children we observe a pseudocrisis or the so-called precritical drop. It is assumed that this first drop in the temperature is due to the formation of almost sufficient antitoxin in the blood, and the subsequent rise in temperature during the next day, represents formation of new toxins, which the body readily overcomes by renewed production of antitoxin, and thus the true crisis is brought about. The blood in lobar pneumonia in contradistinction to that of typhoid shows a well marked leucocytosis of the polynuclear type. This is present almost from the onset and lasts until after the crisis. The average white blood count is about 32,000 the lowest being about 20,000. The highest 56,000. It is usually more marked where more than one lobe is

involved, but bears no relationship to the temperature.

Complications. The complications of lobar pneumonia are quite frequent and play an important role in the prognosis of the disease. They are attributable either to the action of the pneumococcus and its toxins on various organs and tissues of the body, or to the secondary invasion of other organisms. The most frequent and important complication of lobar pneumonia at this period of life is empyema. It is almost always due to the invasion of the pleura by the pneumococcus. This usually takes place by means of the lymphatics. Even if at first the fluid is not purulent, it soon assumes that character, if the pneumococcus itself is present in the pleural cavity. Our experience at the Mt. Sinai Hospital in Dr. Koplik's wards has been, that if the fluid withdrawn from the pleural cavity, though clear, showed the pneumococcus, invariably empyema developed within a short time. Although the usual site of the accumulation of pus is at the base we should not forget the occasional occurrence of interlobular, sacculated, and apical empyema. In these regions the diagnosis is not so readily made, and if suspected we should not hesitate to introduce an exploratory needle. Aside from the well known physical signs, this complica-

tion should be suspected, if after the crisis there is a gradual rise of temperature, accompanied by pallor, sweats, and nonappearance of the expected convalescence. In apical and central pneumonias, there is often present a serous meningitis, giving such marked symptoms on the part of the central nervous system, that the erroneous diagnosis of a purulent meningitis is made in the beginning. This condition has been called meningism, but is in reality a serous meningitis, the result of the action of the pneumococcus toxins on the central nervous system and the meninges. When the pneumococcus itself invades the nervous system, then we have a purulent pneumococcus meningitis, which is a much rarer and more fatal complication. Otitis media is frequently seen, and is equally as frequently not seen because of lack of examination of the ears. Other complications which have been observed are too well known to merit extended consideration. Some of these are gastro-enteritis, pneumococcus peritonitis, nephritis, endocarditis, pericarditis, arthritis, mastoiditis, parotitis, etc.

Prognosis. As a rule lobar pneumonia in children terminates in complete recovery. Fatal cases are seen during the first year of life and in older children in the presence of such complications as

empyema, mastoiditis, meningitis, pericarditis, and peritonitis. The previous condition of the patient plays an important role. In uncomplicated cases the mortality is usually from 5 to 8%. A high temperature associated with a high leucocyte count and high percentage of polynuclears is a favorable prognostic sign. Marked prostration, cyanosis and dyspnoea, extensive lung involvement, and a low leucocyte count render the prognosis unfavorable, but even in the apparently most hopeless cases, recovery may take place.

Broncho-Pneumonia. Broncho-pneumonia is usually secondary to the acute infectious diseases, or to acute diseases of the upper respiratory tract. Being secondary, the clinical course is much less definite than that of lobar pneumonia and its onset and duration more variable. In most of the cases the onset of broncho-pneumonia is preceded by a bronchitis. When the inflammation extends into the bronchioles and alveoli, the first symptoms of broncho-pneumonia appear. These are, rise in temperature, increased respiration, dyspnoea and rapid pulse. In addition to the signs of bronchitis we now discover the presence of fine rales scattered over various areas of the chest, mostly over both infrascapular regions. The extent of lung involvement is very variable. In some cases we find no other physical signs than that of bronchitis.

In others we have in addition smaller or larger areas of dulness with broncho-vesicular or bronchial breathing and bronchial voice. In extensive involvement of many contiguous lobules the signs may closely resemble those of lobar pneumonia. In other cases, only signs of diffuse bronchitis are present throughout the entire course of the disease and we are here only enabled to diagnose the existence of a broncho-pneumonia by the general condition and symptoms. The usual duration is from one to three weeks, but may be considerably longer. Relapses are seen frequently and the termination is usually by lysis. A polynuclear leucocytosis is present here as in lobar pneumonia, the average is about 34,000, the maximum being 73,000, and the minimum 13,000. While lobar pneumonia is frequently seen in the adult, broncho-pneumonia is much more common in infants and children.

Complications. The complications of broncho-pneumonia are chiefly due to the local extension of the inflammation. Empyema is not as frequently seen as in lobar pneumonia. Interstitial pneumonia, pulmonary and lymph node tuberculosis are not frequent sequelae of this affection.

Prognosis. Broncho-pneumonia is a much graver disease than lobar pneumonia, as it usually affects infants and children

whose resistance has been lowered by previous disease. The mortality varies from 10 to 30%. In young infants it is very often fatal. Extensive pulmonary involvement, prostration, marked dyspnoea, and cyanosis are very unfavorable signs.

Although these two diseases have been considered together tonight, they are in reality two distinct affections. Distinct in their pathogenesis, pathological anatomy and clinical course. In fact their only relationship is, that they both involve the lung tissue.

We may express the hope that future bacteriological studies will enable us to place their classification on a firmer basis than is possible at present.

DISCUSSION.

Dr. William P. Northrup said, I have regretted very much that I could not hear the first and all of Dr. Heiman's paper. I was lost in darkest Brooklyn until quite late in the afternoon and I had to have dinner and I got here as early as I could. I have been sort of an understudy of Dr. Hymanson. He gets the pneumonia case first and the consultation fee and I come in when he cannot be found, so incidentally we have seen quite a number of cases this winter together and ripping bad ones. I am sorry his paper could not be discussed with the other because some features interested me very, very much.

It was very obvious to me as Dr. Heiman's paper was going on that we are thinking of different ages of children. Do we mean a child a year old or one three years old or five when Dr. Heiman speaks of the voice sounds, of 1, 2, 3, and moo? The patient I think of is not old enough to say moo or 1, 2, 3. So when we discuss pneumonia in children we must limit ourselves

to a more or less definite age. I am thinking of infants under two years. None of them could say moo, especially when they have pneumonia. They are too sick and too stupid.

I was thinking of the definition of pneumonia and the things I was going to say Dr. Berg stole away from me.

Dr. Freeman and I have been seeing the same cases and we think in harmony. I read between the lines that he is thinking of the kind of cases we see at the Foundling Hospital and at the Presbyterian, and that he also sees at the Nursery and Childs. They are young children, too young to say moo. If they will only keep still and not scream we are thankful.

What is our definition of pneumonia? In my student days when I was working in the laboratory with Drs. Delafield and Prudden, it was the great question, and it seems funny today, whether pneumonia was a local disease with constitutional symptoms or constitutional with a local lesion. What is pneumonia as we see it in children? It seems that there is a bacteremia, an infection, and whatever the cause of the so-called pneumonia, the infecting agent is certainly in the child. We can have pneumonia in the ear, in the precordium or in the heel.

It seems to me in discussing complications, that empyema is not the most common complication with us. It is commoner in older children especially if not well nourished. I have seen very few empyemas at Presbyterian Hospital but the common complication was in the ear. I have had installed in my observation ward a fifty candle power electric light that they can wheel around to the bed, and every ear must be looked at if the patient has any fever or obscure temperature. There is almost an epidemic of ear trouble. A large number of them have otitis media. It does not go on to mastoid trouble. The ear is the primary complication with me. Dr. Heiman mentioned the intestinal complication. I will take empyema every time for mine rather than a bad gastro-entero-colitis. It is a most discouraging and dreadful complication. The whole bottom drops out of our case when it has a bad diarrhea. It is more and more my way of thinking that it is a bacteremia. It seems more analogous to tubercular meningitis, this

dissemination of the lesion by the blood stream to different parts. I am thinking again of children under two years. I believe Dr. Heiman is thinking of older children when he speaks of the diagnosis, prognosis, etc. The temperature chart, Dr. Heiman says, drops in the case of lobar pneumonia by crisis and in bronchopneumonia by lysis. I see many charts that look like sepsis. It is a bacteremia whose toxines give rise to an irregular chart. I learn a great many things from my house staff, though we do not always admit it. The house physicians coming from the adult services find temperatures of pneumonia in children that look like typhoids and sepsis, etc., until they learn more about them.

I don't think so much of the hardening of the muscles. If we have a sore spot anywhere, we are careful of it, but beyond that, I fail to see that the prognosis is any different.

I have been at this job twenty-nine years and I don't care about the apex part. The opisthotonos part Dr. Berg took away from me. The best picture I ever got was a child which stood on his heels and head and he died and had only enterocolitis and marasmus, nothing else.

There are quite a number of very essential things in the prognosis, diagnosis and treatment which are to be thought of especially in the young child which is two years old. To me, the essential and characteristic chart of pneumonia begins when the parenchyma of the lung is involved. A child out in the park with light clothing catches cold in the head, larynx and trachea. So far it is catarrhal inflammation of the larger bronchi which gives fever and cough, but it is not until he has parenchymatous pneumonitis that he begins to have that dopy look, continuous fever and rales of the fine kind heard at the base. It is on these that I prefer to rest the diagnosis in infancy, on the sudden onset and on the fever which gives that dopy prostration. Most of the women would tell you the child began at four o'clock to be dopy. He had a red spot in the face and began to be sick. The disproportionate respiration pulse ratio is because the pneumonia toxins stimulate the respiratory center out of proportion to the pulse center. I think that is the essential feaure of it and one of the valuable features. After that the rales.

In summing up. *The sudden onset.* The mother will name the quarter of the day when the child was taken sick. It was sick, dopy, and had a fever. The father was photographing the child at twelve o'clock and it was gay and a good subject for photographing and at two o'clock it waked and was cranky, couldn't do anything with it, began to be sick and ran a straight pneumonia.

When the pulse respiration ratio departs. I think O'Dwyer was the one to emphasize this and I like to think when it departs from the ratio of one to four and approximates one to three, the chances are that the disturbance is in the pulmonary tissues, that the lesion is there.

I heard a paper read mentioning a large percentage of cases of pneumonia that had before the development of characteristic pneumonia, ear symptoms. I don't recall how he verified them, whether by looking at the drum or by opening or what.

Blood count and prognosis. In these young children the blood count wobbles around most atrociously. The worst case I ever put out in the sun because it was the last resort for a desperate case, we shovelled away the snow so there was a bank on all sides and we stuck him out there. We said everything is against him, he can hardly keep enough air in his lungs to keep him from being purple. The minute he is anywhere indoors, he is restless and toxic and his leucocytes were away down out of sight and my freshly arrived house physician said, "He is gone sure. I have never seen a child that had such a low leucocyte count get well." I said, "Now don't you forget that. You can think again and if they are way down, give up all hope." I rubbed it into his back, front and face. I said, "Write it down. Put it into history and sign your name." The child got well so quick, it was really a brilliant recovery.

Blood count. Our men are hungry to count blood. We have men to count all the blood and keep at it. We keep them busy at it but really it does not help a lot in children. I think children are the funniest things in the world anyhow. They don't do anything they ought to but they have a way of living. When the house physician comes down, I show him

a sick child, one of the worst, and say, "Are we to put him on the danger list?" He has him already on the danger list. I see that as I go in. I ask, "When the friends arrived and asked how many chances he had, what did you tell them?" "I told them he was not quite in." I then say, "Tell them when they come again that they couldn't kill him if they tried. You write that down on a little piece of paper."

There are three important things to know a lot of things about. First, summer diarrhea which is incurable. Second, pneumonia, they get well anyhow. Third, obstruction of the bowel and that is my black pest.

It is perfectly obvious from all that has been said that we cannot tuck a nickle in the slot and get a diagnosis of pneumonia in infants right away. I have been very much interested in the three classical papers. The figures of Dr. Hymanson were interesting.

Dr. Freeman's observations of the pneumonia as a general comprehensive proposition I fully endorse. We have worked in the same dead house and have seen the same cases. Dr. Heiman's paper is valuable in the extreme. It does not quite cover the same age. He begins after two years. I want him to say if that is not so. We have these three valuable classical papers. I hope they will be published.

Dr. Louis Fischer said, I will speak on the treatment which is almost as important as making a diagnosis. Considering the papers we have had so far, I think the subject and the symptomatology and diagnosis have been pretty thoroughly covered. There is no use of rehashing.

One word about pneumonia and that is in making the diagnosis of pneumonia in children, we should get away from the text-book symptoms, that is, I am usually asked, "Is it not a fact that pneumonia begins with cough and consolidation and bronchial breathing and dullness on percussion, etc?" As a matter of fact in the large number of cases seen by me, children do not cough in the very beginning. It is a symptom which comes on later in the disease. The early symptoms are high fever, disturbance of the normal pulse ratio and coated tongue, etc., which would make us believe we are dealing with gastrointestinal indigestion, commonly called spoiled stomach.

If dealing with persistent fever after castor oil and rhubarb and soda have been administered and the diet corrected and the fever persists, if throat and ears have been properly inspected and there is nothing to be found, I usually suspect a limited pneumonic process, called a central pneumonia. These are the cases which baffle us early in the disease and it will take two to three days until the diagnosis can be made positively.

In the course of the discussion I said if we have meningeal symptoms and no distinct symptoms of consolidation, it is not unwise to do a puncture because it is a very simple procedure and will help in diagnosis. I have had no less than seventeen cases of cerebrospinal meningitis in children under one year and it was only this last fall that a baby seven weeks old was brought to my service with vomiting and fever for a number of days. I did a puncture which plus the bacteriological findings gave the diagnosis.

An examination of the lung should always be made whether or not the gastric symptoms of an acute infection are present. I make it a routine practice in seeing cases for the first time to invariably go over the thorax. I think it is as important as taking the temperature, because very frequently when we least expect to find a pneumonia, we will find it.

The wandering type of pneumonia is another thing which is very disagreeable. During the present winter I have seen a number of cases of persistent fever of an acute lobar pneumonia and there it was simply a question of an extension from one lobe to another. It was the wandering type. In one case there were three distinct lobar infections in one child which simply took one month to attain its final issue. The temperature came to a crisis, there was a reinfection, a temperature rise to 104 which again persisted for six to seven days and the crisis was followed by a third rise in temperature and again its crisis.

In blood examinations, the leucocyte count is not a very important aid to me in the diagnosis of the obscure fever after pneumonia. I refer to that which has a pseudo-crisis following a normal crisis and suddenly there is a rise in temperature to 101 to 102 and this temperature going up or down which will give the suspicion of a complication. We look after

the ears, try to exclude otitis media, palpate the mastoid, then we must not forget the kidneys as a possible source of infection and even in young children I try to get the urine examination at least once. The possibility of the diminution of chlorides is a very valuable aid in the diagnosis of pneumonia. The chlorides are diminished in pneumonia. It is important to examine the blood and I usually watch to see how the leucocytosis behaves. If I see the polynuclear percentage rise and the leucocytosis quite high, 23,000 to 25,000, this with polynuclears 73, 74 or 80, I look for a dull area and if I get any distant breathing and flatness or dullness on percussion, I put my needle in and try to find pus. During the past week I have seen three empyemas and two of these were fatal. This very winter there has been quite an amount of empyemas.

One more word, which is very important. The treatment of lobar pneumonia. I believe in oxygenating the lungs. It is our duty. As pneumonia is a communicable disease, we should exclude all useless outsiders. I am not in accord with people who teach that cold winds or south winds are very valuable for very frail and pneumonic children with subnormal vitality. I individually should say I cannot expose a child who is cyanotic in a room filled with cold air. I have seen so many fatal cases following such exposure that I desire to go on record against it. I would not do it with my own child. The effect of such exposure is fatal. When children have been coddled with blankets, etc., one must individualize.

Dr. Walter Lester Carr said, Dr. Freeman made a valuable point in connection with the etiology of pneumonia in well-to-do children as commonly having its origin in influenza infection. I think that is the most ordinary source of the disease of this type. With reference to some of the clinical varieties it is very important that we should realize that a great many men who are good observers and diagnosticians fail to determine pneumonia in an infant or very young child. A common condition is that attention is paid to minor matters with neglect of the lungs, that is, a baby with diarrhea will be treated for diarrhea without examination of the lungs. A case of this kind

came under my notice where a very good physician had been treating the patient.

The irregularity of the appearance of symptoms of pneumonia associated with influenza would have to be considered in making the examination, and sometimes these are very acute in their onset; for example, a little boy I saw ten days ago in Brooklyn. This boy had measles, the temperature was normal ten days and ran to 104.5, he had very acute pain and examination of lung showed one area of pneumonia with pleurisy no larger than the stethoscope.

These conditions may be associated with the continued infection of influenza where it is supposed to be cured. A baby I saw today with a physician uptown, 2½ years old, where influenza began just before Christmas with the very mild type of inflammation of the throat, had a slight discharge from one ear. It was supposed after that that the patient was all right. We found pneumonia at the base of each lung.

Another case I saw last winter was that of an Italian physician who had made all arrangements for an operation on his own child in which there was pneumonia at the base.

Some cases simulate typhoid. It is only by blood examinations and examinations of the lung that a mistake is avoided.

A leucocyte count is sometimes useless to go by. I saw a case in Jersey last month where a health officer examined a boy, found a Widal, a leucocyte count of 52,000, and, on the strength of the findings, said it was a very severe case of typhoid complicated with some suppuration. The amount of pneumonia was not great. It was the right axilla and in about four days, the boy was perfectly well. So I think all these conditions and associations of pneumonia in childhood should be thought of, and great mistakes may come from failure to examine and reexamine the lung.

The lung in the older children is easily examined but in younger children the condition is easily overlooked.

Dr. Thomas S. Southworth said: I would emphasize the importance of the management rather than the treatment of pneumonia. The treatment is very much overdone. I am inclined to think that a good many of the fatali-

ties are due to excessive treatment and excessive cardiac stimulation.

Of the important things in the management of pneumonia the first is fresh air. I am surprised that Dr. Northrup would talk so long without saying more about fresh air. It is most important where the child is breathing 30 to 50 to the minute, shut up in a close room where the oxygen is removed by the patient's breathing, the lamps and sympathetic friends. I do not believe in exposing broncho-pneumonia cases to cold air but I believe in giving lobar cases cold as well as fresh air and fresh air always to the broncho-pneumonia cases.

An important thing is the food. In the initial stages of any acute infectious disease, digestion is at a low ebb. The food should be cut down and ordinary articles should be cut out and milk should be the diet, not only milk alone but the milk should be diluted. Abdominal distension is one of the serious embarrassments and that can be prevented by proper management of the diet. It embarrasses the heart and the lungs. It should be prevented and not treated.

The third thing is to secure comfort, rest and sleep. Comfort by bathing, comfort by environment. Bathing is also useful for the temperature. Don't sweat the child which has a temperature of 103-4. Allow the child to rest between the treatments some. One has noticed a nurse puttering around the room with all the lights turned on. Secure sleep by drugs if necessary and when we wish a child to sleep, be sure that the room is dark. It is almost impossible for anyone to sleep with a bright glaring light and this fact should be considered more with children than adults.

I have not said anything about treatment as such. I should reserve stimulation toward the end of a pneumonic process. Almost every hospital interne whom I have come in contact with is anxious to put every pneumonia case as soon as it occurs upon some sort of treatment—usually cardiac stimulation. My success in treatment of pneumonia is directly in proportion to my ability to restrain the staff. Don't thrash a tired horse if we want to make a successful journey. The management of pneumonia is in aiding Nature and the chief

aids are easily absorbed food, comfort, rest and sleep and the minimum of medication.

Dr. Henry W. Berg said, a thought occurred to me as I was coming to the meeting tonight that it was almost a presumption for us who are treating children and adults to come here and talk to you or pretend to lecture to you on a subject like pneumonia. I see many members of this association and pneumonia is the one disease which I find is rarely overlooked by the average east side practitioner. They know pneumonias because everyone is likely to lose his clientele if he does not diagnose pneumonia. The clientele is not likely to be satisfied.

What is the use of talking to you about symptoms which are not auscultatory, which cannot be heard? Everyone expects when we talk about pneumonia that we will tell exactly where it is. I remember a case in Fifth street. I suspected pneumonia in one boy who had a temperature. I went over the lung from top to bottom three times a day and couldn't find a sign of the pneumonia. I told the mother and father that we were dealing with a pneumonia according to all the symptoms, the 1 to 3 ratio, the child's voice, etc., but the physical signs were not there. I had Jacobi in consultation and he couldn't find the pneumonia. During the next seven days it was almost a crucifixion to go in there and not locate the pneumonia. The diagnosing of pneumonia consists in simply training the ear to recognize certain physical signs. One of the best pathologists in New York expressed the wish that some day this disease would be known as pneumonitis. Clinically there is no disease which looks so badly as pneumonia and yet there is no disease which has a better prognosis. It has made many successful physicians in New York. It is a disease which looks horrible and yet the crisis occurs and the physician gets the credit. Broncho-pneumonia is more of an insidious disease. I would rather have a child with a lobar pneumonia and a temperature of 105 than a child with a broncho-pneumonia and a temperature of 101 and going on and on and liable to end in tuberculosis.

In lobar pneumonia the disease is limited to one lobe or to one lung. We will not hear a mass of rales all over one side of the chest, not

even in all parts of the same lung. They will be limited to one lobe or to one lung.

Secondly, we will find that these lobar pneumonias in the early stage are accompanied by a peculiar grunting breathing. When we enter the room we can tell a lobar pneumonia by the breathing. We cannot do this in broncho-pneumonia. A broncho-pneumonia sits up and plays with toys, a lobar pneumonia never does this. A peculiar flush, the peculiar characteristic drop of crisis, these are characteristic and distinctive things. A presence of a primary disease to which broncho-pneumonia is secondary is important in broncho-pneumonia. If we are called in to see a broncho-pneumonia, and the child has a discharging nostril, take a culture and we will find probably the Klebs-Loeffler bacillus. That child has diphtheria and has infected the lungs and has diphtheritic broncho-pneumonia. If one is not familiar with the sound of breathing over the lung in the presence of a diphtheritic membrane in the larynx, one might say this child has lobar pneumonia over the left lung. What we really hear is bronchial breathing due to transmission of the bronchial breathing from the larynx down the bronchi and into the lung.

In lobar pneumonia cases the prognosis is favorable, and in broncho-pneumonia cases the prognosis is unfavorable and in 70% of cases, we will get recovery and in 30% of cases death. It is important to give a favorable prognosis in lobar pneumonia and an unfavorable prognosis in broncho-pneumonia.

Summing up by **Dr. Heiman.** I want to thank Dr. Northrup for calling my attention to the ages. I really had more reference to older children.

In reference to the pneumococcus occurring in the ear and when occurring in the lung, we call it pneumonia and in the joint, arthritis, we have the same condition of affairs in rheumatism, if it occurs in muscle tissue we call it rheumatism, if in the tonsil, we call it tonsillitis.

In children up to one year, if the blood count is 15,000 to 20,000, it is still considered normal. In those cases where we have a low white blood count, we must also make a differential count.

In order to get a valuable chloride of sodium estimate in children, we should have a twenty-four hour specimen, and to obtain that in children is extremely difficult.

The real pneumonia occurring in typhoid also gives a low blood count.

Dr. Southworth mentioned the fact that cardiac stimulants are abused. I am very glad he mentioned this. We should not over treat the patients in this particular disease.

The abdominal distension is often due to the toxins due to paralysis of the gut and these are the most difficult cases and almost always fatal.

PNEUMONIA IN CHILDREN.

BY

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A physician in the active practice of his profession cannot long disregard the subject of pneumonia in children. This is true in part because the disease as it occurs in the immature differs in many particulars from the disease as it occurs in adult life. A disregard of these differences must inevitably lead one into serious error while upon the other hand an appreciation of them will add much to the skill with which the disease is handled.

General appreciation of the finer points of the disease as it occurs during adult life is everywhere evident but not so much can

be said in regard to a general knowledge of the disease in childhood, therefore, I feel justified in subserving possible completeness to a consideration of the more practical points of difference in the disease as it occurs in adults or in those of more tender years. Conciseness demands that only such differences as are of practical value be considered.

Frequency. One of the most interesting questions and one which seems to puzzle the majority of practitioners is that of the relative frequency of lobar and broncho-pneumonia. It has been my common experience that lobar pneumonia is considered by a large proportion of men in general practice as uncommon in young children and that attitude toward the disease has frequently led to its being overlooked.

There can be no question but that broncho-pneumonia is very common during the earlier and later periods of life and that after the fourth year of life it becomes *comparatively* an uncommon disease. But this fact should not lead us to the supposition that because a broncho-pneumonia is common during this early period of life that lobar pneumonia must be rare.

Several factors may have contributed to this view and undoubtedly one of the most important has been the infrequency with which the disease is seen post-mortem.

The low mortality in children, of course, is mainly accountable for this but in addition there is the fact that when a young child dies it is almost invariably from some complication of the disease and the process in the lung has cleared up.

And, again, broncho-pneumonia is very frequently a fatal complication of lobar pneumonia in children and when death occurs the original process (lobar) has disappeared.

The difficulty has also evidently arisen through an inattention to frequent and thorough examination, to misinterpretation of the physical signs or to both.

But even disregarding these latter factors, a study of the literature would strongly indicate that results in the study of the relative frequency vary at different times and in different places and that no two groups of cases would show similar results.

My experience has been that at least thirty per cent. of all the pneumonias of infancy are of the lobar type.

My object, however, is to again emphasize the fact that lobar pneumonia is not a disease uncommon to the early period of life.

The Course of the two types of pneumonia in children differs greatly. Lobar pneumonia continues with persistent high

temperature and the local phenomena remaining quite constantly the same until the time of the crisis which usually occurs between the third and seventh days. The drop in the temperature at the crisis may be only temporary, however, and it may again reach its acme within twenty-four hours after the fall, but the recurrence is for a few hours only.

No such course may be expected in broncho-pneumonia; there is persistency of temperature punctuated with an irregularity marking apparent periods of improvement and retrogression and this is continued over a *protracted* course.

It is readily seen when one considers the pathology that critical defervescence cannot become a clinical experience in broncho-pneumonia, but that the duration must be indefinite and is frequently extended from weeks to months.

VARIATIONS IN THE COURSE.

Lobar pneumonia may occasionally become associated with an acute or chronic bronchitis which has existed for a considerable period and in such instances the new process by weakening the resistance of the child allows the old process to become more prominent. In such instances, rales may be demonstrated in the bronchi throughout the whole course of the disease

and in addition there are signs of consolidation. Such a case might terminate in several ways; there might be a crisis on the fifth, sixth or seventh day; the crisis occurring, there might be a persistence of a temperature of an irregular type which was dependent upon the increased bronchial catarrh; on account of the previously exhausted condition of the child and the previous interference with respiration the lobar pneumonia might follow a more protracted course than usual and critical defervescence be deferred by one or more relapses.

Lobar pneumonia may run a protracted course and this is usually explained by the fact that there is a development from the original focus to neighboring areas. Thus it may in a measure simulate the protracted course of broncho-pneumonia, but with this distinction, that there are absent the daily marked remissions of temperature which are so common to broncho-pneumonia, and in their stead there is persistent high temperature for two or more days with somewhat sudden remission and that soon followed by persistent high temperature again.

A post critical rise of temperature is not uncommon in lobar pneumonia. On the first day of the crisis there may be a sudden elevation of the temperature from normal or subnormal to its original acme and this

at once arouses the anxiety of the attendants. Why this occurs, I have never had satisfactorily explained; there is no detectable change in the physical signs and its existence is short-lived for within twenty-four hours the temperature becomes normal again and remains so.

Rarer than any of the other anomalous forms is one in which all of the symptoms are very marked and typical for seventy-two hours or less, and then the occurrence of a sudden and complete clearing up of all the physical signs of the disease, the affection not having gone beyond the stage of congestion.

A rare anomalous type, and yet one that has not proven so rare since skill in the appreciation and correct interpretation of physical signs has been advanced, is that type in which the physical signs of consolidation gradually disappear and the signs of resolution occur but with no marked remission in the temperature. Then after two or three days of improvement in the physical signs there occurs a crisis and uneventful convalescence.

There are some individual symptoms which in children differ greatly from those which are observed in adults. For instance, the symptoms which accompany any rise in temperature are more severe owing to the child's immature nervous sys-

tem and this is irrespective of the type of the pneumonia. Gastro-enteric symptoms are common and usually prominent features of the onset of the disease and may at times be so severe as to prove misleading. Vomiting which is rare in the adult is very common in children. The pulse rate alone is of no value in infancy and the ease with which its rhythm may be disturbed renders it a valueless guide at this period of life.

In lobar pneumonia at the onset a chill is common to adults, but in children such an occurrence is rare although there may be a condition which somewhat approximates it, as coldness of the limbs or cyanosis (particularly about the lips). In the very young, a convulsion may take the place of the adult rigor. The cough is often so slight as not to attract particular attention and is never as prominent as in adults. Rusty sputum is only observed in very rare instances and most cases exhibit no expectoration at all. Short invasions (abortive pneumonia) are common in children and the disease shows a decided tendency to location in the apices (35 to 40%). The crisis is marked by a more gradual fall in the temperature than in adults and is rarely accompanied by the sweating, prostration and marked signs which we see in adult cases. Altogether it is a much less prominent feature and this must be recalled in

diagnosing and treating the disease in children.

Pain at the onset in children is never definitely located and is usually referred to regions outside of the chest; as to the loin, to the epigastrium or to any situation to which the intercostal nerves are distributed.

The difference in the mortality in lobar pneumonia is strongly in favor of the child and in broncho-pneumonia it is decidedly against the young.

The Diagnosis involves first a determination of the type of pneumonia and this is usually easy unless there is an anomalous course or the two types are complicated. In lobar pneumonia the inflammation at once attacks the lung tissue without a preceding bronchitis and from the onset the whole or part of a lobe is affected. This onset is sudden with well defined symptoms and a definite course in contra-distinction to broncho-pneumonia which is always secondary, more gradually developed, exhibiting a temperature with marked daily remissions and an indefinite course. (See course of disease).

After a determination of the probable type from the history of the onset the physical examination must be used to confirm it. In lobar pneumonia one must not expect to find similar signs as in adults. If the peculiarities of the child's chest are not

considered the examination must prove misleading instead of conclusive.

The earliest percussion signs are those due to the acute congestion. In consequence less air gets into the affected area and more is forced into the healthy portions so that over the affected area there usually is a diminished resonance with an exaggerated resonance elsewhere. But this is far from being conclusive. Percussion may even fail to outline the affected area either because it is limited in extent, is centrally placed and covered with healthy lung or because a gas distended stomach or intestine interferes with the examination.

At the onset, auscultation which is of great value in adults is less in children because of their inability to co-operate in this part of the examination. A feeble respiratory murmur over the affected area with rather high pitch is the rule with exaggerated sounds elsewhere. Later in the disease the physical signs closely approximate the adult type.

In broncho-pneumonia, the physical signs more nearly approach the adult type, although the percussion dulness is so exceedingly meagre in proportion to the extent of the consolidation that if much dependence is placed upon it as an indicator, it will lead to error. It cannot be too frequently

stated that broncho-pneumonia may run its full course without the signs of consolidation having been present at any time during the disease. The result is that auscultation is of far greater value in the diagnosis. Auscultation does not markedly differ from what is heard in adult cases, except that because of the usual greater involvement of lung tissue, the sounds are all intensified and more widely distributed.

Even with its variable symptoms the diagnosis of broncho-pneumonia is presumably made if, in an infant, we observed a high temperature with marked daily remissions, associated with much increased respiration, cough and dyspnoea, and positive signs of other disease were absent.

THE DIFFERENTIATION OF LOBAR PNEUMONIA FROM OTHER DISEASES.

The sudden onset with vomiting and high temperature might lead to the suspicion of either tonsillitis or scarlet fever. Tonsillitis offers a true difficulty unless there is a clear history of many previous attacks and the local signs in the throat are marked at the onset. Scarlet fever cannot be excluded until the following day when the characteristic eruption should appear. In those rare instances in which the eruption is delayed or slight the presence of angina

after a known or suspected exposure would make a delay in the diagnosis necessary until the physical signs of a pneumonia

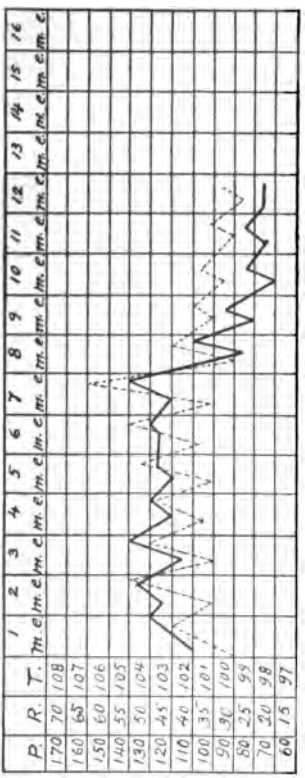

Fig. 1. Chart of the temperature (——) and respirations (----) in lobar pneumonia. Child one year old.

should appear; then the evidence would be conclusive.

During the first day in infants, an acute gastro-enteritis may be suspected, for

vomiting and diarrhoea are so common at this time but with pneumonia as the cause, the temperature and the prostration are out of all proportion to the mildness of the intestinal condition.

If during the first days, a dull percussion sound is detected over the inferior lobe there may arise the question as to its being

LOBAR PNEUMONIA.

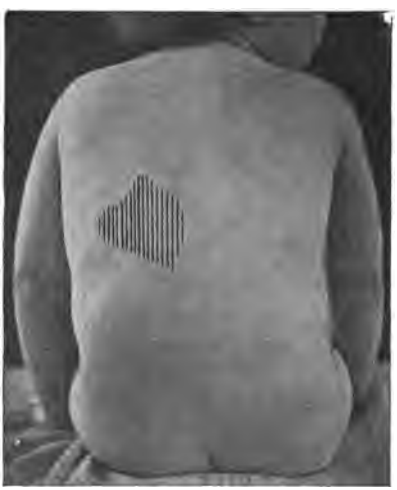

Fig. II. Part (or all) of one lobe is congested (|||||); slight dulness may be detected over this area, or there may be only diminished resonance. Crepitant rales and feeble respiratory murmur exist over affected area. All healthy lung is hyperresonant.

due to pleuritic exudate. Moderate exudate may give dulness in children, but associated with it there is a weakened vesicular breathing and not bronchial respiration, as in pneumonia. Herpes on the lips

or nose would be evidence against pleurisy as it is so rare in that disease and so common to pneumonia. Vocal fremitus which is so valuable in adult is of no service in this situation in the child. Dependence must be placed upon the character of the temperature, the course of the disease, and the meagre physical signs.

LOBAR PNEUMONIA.

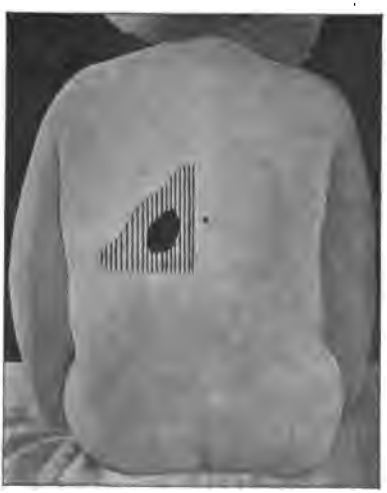

Fig. III. Congestion increased and in center of affected area, pure bronchial breathing may exist; dulness still remains slight (in solid black).

LOBAR PNEUMONIA.

Onset—Sudden high temperature.
Course—Crisis or lysis in a few days.
Signs—Correspond to affected area and suddenly evident.

Gradually developed high temperature; lysis with persistence for 3 or more weeks. Signs: slowly developed in lower portions with gradual increase upward.

If even after a careful determination of these points, the cause of the symptoms remains in doubt, an exploratory puncture should be made.

Not uncommonly the onset of a lobar pneumonia may exhibit no physical signs and the constitutional ones which are present (vomiting, possible convulsions, delirium, stupor, and more rarely opisthotonos) suggest meningitis.

A safe guide in the diagnosis is this; without paying too much regard to the variety and severity of the symptoms, if nervous symptoms are present from the onset and are marked, meningitis may reasonably be excluded. However, if they are present in a minor degree at the onset of the disease and show a steady increase in severity, or if absent at the onset but appearing later and exhibiting this same steady increase, then meningitis must be suspected and not lobar pneumonia.

This guide holds true even in the presence of lobar pneumonia during the course of which meningitis may develop. Suddenly developed nervous symptoms (even severe)

at the onset need be no cause for serious alarm.

Typhoid fever may be suspected as the cause of the symptoms in those cases of pneumonia which in older children show somnolence with a tardy development of physical signs of pneumonia. But the

LOBAR PNEUMONIA.

Fig. IV. Consolidation (solid black) complete in the second stage with dulness marked; congestion more wide-spread; some rales or friction sounds.

early occurrence of somnolence and typhoid-like symptoms would be suggestive of pneumonia and decidedly against typhoid.

At most, one could not remain long in doubt for the tardy physical signs must soon develop. The history of the initial

chill would almost positively exclude typhoid in children.

It has been my frequent experience to see in consultation cases of lobar pneumonia which have been diagnosed as appendicitis. In some cases of lobar pneumonia in children there is sharp abdominal pain which may radiate down the thigh upon the side corresponding to the affected lung. The inability of most children to definitely or accurately locate pain and the common tardy development of physical signs in the lung draw attention from the chest to the abdomen. But if a due regard was given to the occurrence of markedly increased respiration rate and this peculiarity of the disease in children was recalled, less mistakes would be made.

THE DIFFERENTIATION OF BRONCHO-PNEUMONIA FROM OTHER DISEASES.

If during the course of bronchitis there is an evident intensification of the symptoms, we must at once suspect the development of broncho-pneumonia. This intensification with lessened severity of the cough (which is worse in bronchitis) helps to distinguish the disease. But of much importance is the development of real dyspnoea which is not present even in the severe cases of simple bronchitis. Limitation of rales to definite areas is very sug-

gestive of broncho-pneumonia for in bronchitis they are more diffuse.

If the course of a broncho-pneumonia be protracted for several weeks the question arises as to whether there is a tuberculous process present or not. This is especially true if there are formed bronchiectasiae and upon examination large, consonant

BRONCHO-PNEUMONIA.

Fig. V. Coarse sonorous rales (O) at first are detected over both lungs or over a limited area. Feeble breathing over limited area with addition of fine sibilant (oo) rales indicates commencement of first stage.

rales are observed with cavernous respiration. Physical signs are not sufficient for the solution of this problem; similar conditions may obtain in both. The family

history becomes a most important factor in aiding judgment. The onset of tuberculosis is more gradual (it may have been apparently sudden from a hastily taken history), there is loss of flesh which is disproportionate to the severity of the symptoms, a persistency of all symptoms and a degree of anaemia which cannot be satisfactorily explained. In the presence of these symptoms backed by a positive family history, even without an examination of the sputum (which is difficult and sometimes impossible to obtain) broncho-pneumonia may be excluded. Less important factors and yet those to which some consideration must be given are the tendency of tuberculosis to develop in those predisposed to it, during convalescence from one of the infectious diseases and particularly rubeola and pertussis, the surroundings of the child and known repeated exposure to infection.

There is always danger of diagnosing broncho-pneumonia when the true condition is intermittent fever and this is particularly true if the disease, malaria, has been preceded by bronchitis or its onset is accompanied by congestion of the lungs, as is sometimes the case. Enlargement of the spleen, intermittence of the temperature instead of simple remission, the demonstration of the plasmodium in the blood and the effect of treatment would determine the presence of the intermittent fever.

Congenital atelectasis would at times offer some difficulty in its distinction from broncho-pneumonia if it occurred during the first three months of life, but after that it rarely gives rise to symptoms. Excessive cyanosis and absence of marked

BRONCHO-PNEUMONIA.

Fig. VI. Coarse rales increase in extent; fine moist rales are heard over enlarged area and are more localized, more superficial, louder, and higher in pitch. May be partial consolidation (= =).

physical signs in the chest and a history of difficulty in having the infant breathe properly at birth would suggest atelectasis.

The Prognosis. In a previously healthy, well nourished child the occurrence of lobar pneumonia with a limited extension

of the process should excite no alarm. Such cases predominate in childhood and therefore in private practice the mortality is well within two per cent., the fatal cases being those in which there is widespread extension of the disease, or the occurrence of serious complications.

BRONCHO-PNEUMONIA.

Fig. VII. The area of partial consolidation increases and other small areas are found scattered over both sides. There may be complete consolidation (|=|=|) near the center of these areas.

In determining our prognosis we may disregard most special symptoms although some few of these may help us in foretelling the probable outcome (mentioned later) and most of our consideration should be

given to three factors: the age of the patient, the extent of the disease and the presence or absence of complications.

The individual symptoms unfavorably influencing the prognosis are:—vomiting, diarrhoea, tympanites or convulsions occurring late in the disease, a temperature

BRONCHO-PNEUMONIA.

Fig. VIII. During resolution, the areas of complete consolidation disappear; the partially consolidated areas decrease and are scattered with gradually disappearing coarse and fine rales over both sides.

persistently over 105° F. and fever (high) continued over the ninth day.

Broncho-pneumonia must always be considered a serious disease and a favorable

prognosis given only after the most careful consideration of every factor. The prognosis is unfavorably influenced by the following factors: the age of the patient, in infancy the disease is dangerous to life; the previous condition, children of previous low vitality or illy nourished are easy victims to even mild infections. Thus it is readily seen that such a disease as rachitis would unfavorably influence the prognosis.

Complications with other diseases:— These always act unfavorably. The individual symptoms which are of value in reaching a conclusion are: cases with a more persistent temperature (as 102° to 103.5° F.) and the explanation of this may be in the fact that the latter instances are those of mixed infection. The inability or lack of desire to partake of food, the occurrence of persistent diarrhoea, vomiting or tympanites are all unfavorable to recovery.

The environment has considerable bearing upon the outcome, institutional cases contributing enormously to the death rate.

The Treatment does not differ greatly from that of the adult case although there must come the modification which is demanded by the age of the patient and the ease with which the digestive system is disturbed. Some of these differences in management must of course be emphasized;

for the purposes of this paper we need do nothing more.

In lobar pneumonia if the child is seen early a hot bath should be given and also hot diaphoretic drinks. This is good treatment because so many cases of pneumonia in children are short-lived, and while it is impossible to say what effect treatment has upon this result, we must assist nature as much as possible. In addition to these measures, I believe that tincture of aconite given at this stage is of great value and the only drug of any value.

When the disease is once established we have only to recall (a) that it is a self limited disease; (b) and that there is no specific treatment.

The immediate demands are (1) a reduction of the diet; (2) the free administration of cool water; (3) mild purgation; (4) abundance of fresh and cool air; (5) frequent cool sponging to keep skin active.

With the institution of these measures drug giving is rarely needed.

Complications must be watched for and guarded against and this is particularly true of otitis media and pleural effusion. The danger from cardiac asthenia in children is much over-estimated; it is uncommon for me to be called upon to treat it. If this is watched and treated as any other complication should be and it is not supposed to

exist as a matter of course at the time of the crisis (which is usually a mild affair) it may surprise one to find how uncommonly there is call for stimulation.

It is only when certain symptoms and complications force themselves into the

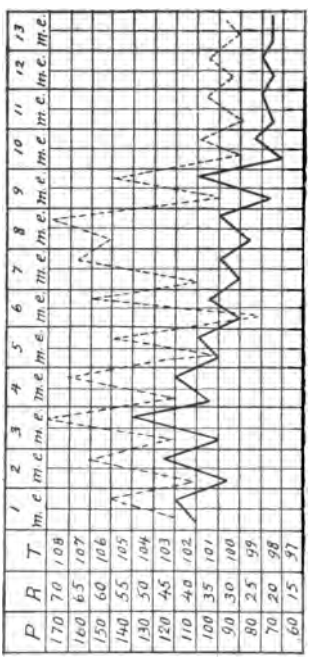

Fig. IX. Chart of the temperature (——) and respirations (----) in broncho-pneumonia. Child one year old.

cyclic course of the disease that drug giving or energetic measures are justified.

In broncho-pneumonia, delay is dangerous; there is no place for expectant treatment here. As I have recommended one drug in the early stage of lobar pneumonia

so I recommend one in broncho-pneumonia. That drug is belladonna, but to be effective it must be given in doses sufficiently large to cause flushing of the face and may be continued for the first few days. Small doses are of no value and its protracted use is not indicated. There must be secured for the child (1) the best hygienic surroundings possible; (2) a diet reduced but of such quality as to properly support the system; (3) free administration of water; (4) regularity of the bowel function; (5) abundance of fresh cool air day and night; (6) strict cleanliness of the body and particularly the nose and mouth; (7) as perfect physical and mental quietude as possible.

The cautious use of the internal emetics are sometimes attended with benefit and while an initial vomiting may prove beneficial in clearing away the bronchial mucus, this method must not be persisted in. Counter-irritation with mustard paste is valuable and it is not wise to wait until pulmonary collapse is suspected, for used early it gives relief from the dyspnoea and cough. Everything that weakens should be avoided; everything that strengthens encouraged.

Stimulation is not alone wise but absolutely necessary after the first few days; delay until the necessity is present means much lost ground, for every one of these

cases need stimulation practically throughout. My preference is for a combination of small doses of camphor and whiskey; the camphor being given in sweet almond oil (¼ gr. to five drops) and the whiskey well diluted with water.

Just as early as possible, tonics should be given for delay in this matter as in the case of stimulants may mean lost ground.

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PNEUMONIA AS A SANITARY PROBLEM.

BY

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U. S. Army Med. Corps.

The attitude of the medical profession towards pneumonia as a preventable disease closely resembles our attitude to tuberculosis two decades ago when that infection was first placed on the notifiable list. That is, there are all kinds of opinions as to the degree of its contagiousness and a reluctance to make the reports, so that it is difficult to get exact information as to the number of cases except in the few parts of the country where the laws are rigidly enforced. Those sanitarians who are convinced that lobar pneumonia is more or less preventable are rather looked upon as extremists, but whether right or wrong it certainly behooves us to give heed to their opinions, for the annual death roll is appalling. In some places ten per cent. or more of the deaths are due to it and in the country at large it probably ranks next to tuberculosis in the mortality tables. Moreover, every age furnishes cases—though

certain decades of life more than their share. So it is highly important to prevent this scourge if possible.

There is considerable doubt as to whether we will ever be able to prevent pneumonia in the aged, for the opinion is very widespread that it is one of the ways in which we normally die after we have run our allotted time of three score and more. We can hardly expect old men to die simply of old age, something must be the final straw which breaks the back of resistance. Consequently as we succeed in preventing early deaths, and thus lengthen average life, there must be a corresponding increase in the diseases of old age. An index of the excellence of sanitation is thus the slow but steady increase of the proportion of deaths from cancer, diseases of the kidneys, circulatory system and senile pneumonia.

Nevertheless there is no doubt whatever that the aged receive their final infection too soon. Scarcely a case of pneumonia comes to our knowledge that we cannot place our finger on some fault of hygiene or sanitation. That is, we die long before we are worn out, and if we can only prevent these faults we will preserve valuable old men, but the mortality tables will show the same causes of death in later ages than at present. Statistics must be interpreted by

making all kinds of allowances, for the figures themselves rarely tell the truth.

In regard to pneumonia at earlier ages we are struck by the fact that feeble children under five and strong men in the prime of life seem to furnish an excessive proportion of cases and deaths, as though sanitation should play an enormous part in prevention, but right here we are confronted by the multiplicity of contributing factors. Shortly it may be stated that anything which reduces vigor makes one less resistant to an ever present infection. It may be all very well to teach that if people will live a sober, upright and godly life they need have no fear of pneumonia, yet it is true that the ordinary ways of making a living do now and then injure us unavoidably, and then is the time when pneumonia would not be contracted if the infection were not so prevalent. There is an increasing volume of opinion that sanitation must step in to prevent the spread of the organisms.

It is right here that the apparent hopelessness of the problem may be stated. The pneumococcus is generally considered a pure parasite which cannot survive long outside of some host. It dies in an hour or so if dried in the light, but will retain virulence some days or weeks if kept moist and in the dark. Like all parasites it could not exist if it killed every host and so it has estab-

lished amicable relations with those able to tolerate its presence. It is found in the mouths of so many apparently healthy people that practically all the population may be considered actual or potential carriers. Moreover it is now known that it occasionally disappears from the upper respiratory tract even in a notorious carrier as though he had killed it off and were subsequently reinfected. We are quite sure then that if we do get "run down," there is an almost certainty that we will encounter the infection if we are not already harboring it. The apparent hopelessness of prevention is emphasized by the fact that we are more and more coming to the opinion that infections are received directly from persons and not indirectly from things. We cannot avoid pneumonia infections except by avoiding association with our fellows.

All these facts are being used as arguments that prevention is really so hopeless if not impossible, as to be beyond the sphere of practical sanitation. Nevertheless there are a few phenomena which put a different face on the matter, and show that it may be possible to reduce the number of cases in the young adult. Particularly could feeble children be saved from close contacts with strangers, though to be sure many a mother may transfer the infection from her own mouth.

The discussions of the dreadful increase of pneumonia mortality in the last 40 or 50 years, have not sufficiently emphasized two facts. The increase is more in the city than in the country and seems to be co-incident with the growth of modern cities which began to crowd people together some fifty or sixty years ago, thus increasing the chances of infection from sneezing and coughing "carriers." The problem would then seem to be one of personal hygiene rather than public sanitation. To be sure men have always crowded together in public and private meetings and must have had plenty of chances to receive the infection directly from carriers, but the usual life was in more or less isolation and with plenty of fresh air. Nowadays our work takes us into crowds all day long and we are constantly breathing living bacilli recently expelled by a carrier. The greater care being taken to ventilate and light all buildings cannot fail to attenuate the infection, so that there is less and less chance of receiving it from co-workers. Unfortunately we do not know where the infection comes from, and the increasing mortality seems to point to factors of city life itself and though there is a growing opinion that we are infected directly by carriers, it is the height of folly to ignore indirect infection from sputum. Pneumococci can survive

some time in street dirt in cloudy weather and it seems reasonable that in the present habit of expectorating in the streets we do inhale myriads of the living organisms every time the wind raises a dust. The problem of prevention then seems to center around the ventilation and general sanitation of all living and working rooms, a renewal of the anti-spitting crusade and enormously more attention to street cleaning.

In personal visits to various cities, the thing which impresses one most unfavorably in the majority of them, is the criminal inefficiency of street cleaning. The chief fault is that so little attention is given to prevention. The average man considers it his right to throw dirt into the street and then have some one else clean it up. At the same time he will not pay for the service and complains bitterly about the taxes if it is done properly. Rigid laws against throwing or sweeping rubbish or dirt into streets are worse than useless in the present ignorance of the people and it is doubtful whether a campaign of education would produce early results, yet that is the only thing to do. Laws are supported by the people after all, and as soon as the majority are convinced of their wisdom and necessity, penalties can be imposed. It is now the commonest thing to see someone throw a handful of powdered

peanut shells in the street, a few minutes later see some one expectorate on them, and then a gust of wind drive the particles of shells with adhering sputum into the face of the next person who happens along. Surely the dangers of street dust can be so fully realized by even the most stupid voter that he will demand deterrent laws. The fines would help to pay for the cleaning.

It has also been suggested that we might return to the good old custom in which each householder kept his part of the street and sidewalk clean. To be sure these are public property but it is a well recognized police power to compel the tenant to clean the snow from his sidewalk. If a few neighbors would keep clean, their increased comfort would be such an object lesson that their example surely would spread. Let the members of the civic improvement societies do this individually and watch the outcome.

The results of placing neat and attractive rubbish receptacles, here and there on the sidewalks, are so good that it is amazing the system is not universal. Yet it is the commonest thing to see streets fairly littered with rubbish and cleaned but once a week or month or even year. If the expense is too great for the tax rate why not induce philanthropists to spend some money that way? There is a widespread opinion that

immense fortunes, acquired in the unusual conditions of America whose vast public resources were free to anyone who would take them, are really public property temporarily loaned to rich men as trustees for the people—at least this is the doctrine of certain rich men themselves. The suggestions for the disposal of the wealth are all in the direction of permanent investment in things for the public good, so that the wealth cannot be dissipated but is a permanent acquisition. The building of good permanent roads is also suggested, for it is now known that communities cannot tax themselves sufficiently for the purpose. It is not a far cry from making roads to keeping them clean, nor from endowments for pneumonia research to those for prevention, but the idea of helping a densely crowded people keep clean enough to avoid tuberculosis and pneumonia is rarely mentioned, though the outcry against the enormous cost of street cleaning should raise the point. Studies of populations have now progressed so far we can confidently state that there are some necessities beyond the reach of congested masses. One of these is proper housing and in that direction immense sums are being expended by philanthropists—another is the impossibility of keeping clean in its sanitary sense. They must be helped. To tax them is expecting them to lift them-

selves by their own boot-straps. Yet it is in this direction of outside help that we must look for the solution of the problem of preventing such pneumonia and tuberculosis as may be contracted from street dirt.

The process of improvement is slow and the millennium far off, so we must be content with a little advance every year. Already we find an appreciable improvement in the spitting nuisance in general. In certain places it has been entirely ended, while there is a marked lessening of the habit even in places where not prohibited. So the outlook is very optimistic and although no practical sanitarian would dare to suggest extreme measures to bring about a perfection of cleanliness at once, yet it is wise to point all our measures in that direction. Certain cities are now very backward in matters of cleanliness and much can be done at once. The main task now is education as to the necessity of preventing pneumococci from being transferred from mouth to mouth.

At the present rate at which pneumonia is killing off the susceptible we are quickly acquiring by survival of the fittest a racial immunity permitting us to live in street filth, but it is too deadly a method. Far better is a community which can live only in cleanliness for they are saved from all kinds

of troubles afflicting a dirty people who may be immune to a few things.

There is much evidence that migration to an unsuitable climate reduces resistance to pneumonia. Eskimos die of it when they come to New York City, and Jamaica negroes in Panama, so that some of our mortality in America among northern European types is unavoidable perhaps. There is an unknown climatic factor which seems to increase susceptibility on going to a warm country or upon the approach of spring. The winter exposures are fatal in some places and harmless in others. Hot weather or hot climate pneumonia is prevalent enough to convince a few observers that the unknown factor is the heat. It has been suggested that our habit of keeping houses too warm is the fault and that in lands where the rooms are habitually cool, the people do not have our deplorable mortality. Whether or not there is any truth in this suggestion, it is one which should be investigated in our sanitary problem of preventing pneumonia, for the relaxation of living in hot air, dry or moist, is a well known phenomenon. Yet this is only one of the thousand matters connected with predisposing causes. The main objective point is the pneumococcus itself. Whether we can go to the extreme of isolating such cases of sickness remains to be seen, but we

can and must keep our streets very clean and in time induce the people to stop the practice of using the highways as cuspidors. The ideal city of the future will have unavoidable dirt removed from the streets as soon as deposited, and all surfaces washed down every night when the weather is not too cold. A dusty day should not be possible, but that is an ideal far in future, and in the present conditions of the early spring utterly out of the question. The difficulties and expense of snow removal will stand in the way for a long time.

THE TREATMENT OF PNEUMONIA.

BY

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It goes without saying, a patient with pneumonia must be treated in bed, and whenever possible, in a large, well-ventilated room, with sunny exposure and open fire-place,—particularly in winter, the late autumn and early spring.

There should be no unnecessary hangings, covered furniture, carpet, etc., in room—in other words, things to collect dust, dirt, or that prevent a free circulation of fresh air. The windows should be wholly, or partially, open, but there should be no appreciable draughts. Some people in health can resist the latter with impunity; in illness, especially of an acute type, I doubt it very much. The actual fresh air, or roof garden treatment, to my mind, is an exaggeration and a passing fad. It may be useful, and perhaps almost essential, in a very few cases, to get a good result. Usually, and especially in very cold or changeable weather, I am convinced it

will soon be abandoned by thoroughly sane, level-headed practitioners of wide experience. Novelty and radicalism in therapeutics of pneumonia are not calculated to last.

Again, here as at all times, let us be convinced that real conservatism is safest and best, with so few exceptions that they scarcely count. I have seen many kinds of treatment in pneumonia tried and given up, and then another, and another—including expectancy, or doing nothing—which is deplorable—and have come to have well founded, convinced notions as to what is best to do at present. Whether something newer and better will soon arise, I cannot say positively, nor can anyone else. We can only say and affirm, this is the best I know of up to date.

In general, the light in the room of a pneumonia patient should be somewhat diminished, at all events, during the period of fever. Sunlight on the bed, or too near the patient, is prejudicial. The eyes and brain are irritated by it, fever is increased, as well as restlessness and general malaise. Too often, even in a hospital ward, I have felt obliged to direct a nurse's attention to this important, but ignored fact. All noise, loud talking, unnecessary friends or relatives should be kept out of the room, for the patient's sake and their own, too.

Any excitement, undue conversation, or even mental attention to others, is a call upon the patient's strength and should be prevented.

Again, we want all the fresh air we can have for the patient, and the breath of others is not conducive to it. Further, and this is a matter, as I believe, of considerable and at times of very great importance, pneumonia is a slightly contagious disease, usually, and in certain seasons and epidemics and in bad ambient mediums or surroundings it is imminently so, with certain individuals. These persons, at the time, have very little personal immunity and will, if exposed unduly, take the disease. *When* the special lack of immunity exists and in *what* persons, it is, with our present knowledge, impossible to state in advance. All we know is—it really exists and we should not permit exposure to contagion when it serves no good purpose in any way to incur it, and may possibly bring disease to the individual who foolishly exposes himself. Even in hospitals, so far as possible, patients should be isolated for quiet and to avoid the risk of contagion to others.

Now, there are times when despite all reasoning and common sense, so-called feeling—and often merely emotional and without great or real, continuous value—

leaps at a bound, as it were, beyond our control, and danger is uselessly incurred, once or repeatedly. How protect people who thus act efficiently against themselves and their own poor judgment? How be helpful also, in a certain measure, to the patient suffering already from pneumonia? I know of nothing equal at all—and also less objectionable, than the frequent or almost continuous inhalation of beechwood creasote, vaporized by means of boiling water in a croup kettle. The vapors should be controlled as to concentration and duration at one time, according to circumstances and the special susceptibility of the patient. I do not consider it essential or desirable to go into all the particulars of this mode of inhalation of warm creasote vapors at the present time in cases of pneumonia, as I have done so elsewhere, and on more than one occasion. I would add simply that creasote has some antiseptic value, unquestionably, that it is relatively very innocent in its action and is an anti-catarrhal remedy of highest value. It may be used at times internally, in the treatment of pneumonia, with very happy effects—but here, tact and good judgment are very necessary if we hope to obtain from it evident, good results. Whenever creasote is taken by the mouth in pneumonia, it must be given in solution in small, frequently repeated doses and to

those patients to whom the taste or odor may not be too repugnant. With it must be combined ordinarily, whiskey, rum, or brandy—and glycerine.

It is most important to keep the mouth and throat in as good condition as possible. To this end I recommend the use of Dr. Augustus Wadsworth's antiseptic mouth wash and gargle. The sputum also should be disinfected, or the cloths into which the patient expectorates be burned. As a rule, there is no indication for so-called cough mixtures. They serve no useful purpose and are apt to produce nausea and to prevent the assimilation of food.

Food is important in pneumonia, and I object to too great limitation of the things which may be given. It must be light, nutritious and usually in liquid or semi-solid form—milk, broths, eggs, jellies, whey, custards, blanc-mange, etc.—are all unobjectionable. Solid food during the febrile stage must not be given. It is desirable to have the patient drink abundantly spring or a mild alkaline and occasionally effervescent water. From an undue amount of water, however, dyspepsia, with annoying symptoms, may be caused. This fact should be kept in mind. The bowels must not be permitted to be clogged, but must be attended to, if required, with enemata, or a laxative by the mouth, pref-

erably, an occasional blue pill, followed, or not, by Hunyadi or Apenta Water.

The patient's position in bed is important. Patients must not lie for any length of time absolutely flat on the back. They must be turned now on one side, now on the other. They must be raised more or less in a semi-upright position, supported with a bed rest, protected preferably with a firm pillow, of horse-hair or other material. In this way, local congestion, and particularly at the base of the lungs, is prevented and the dreaded hypostasis avoided or prevented, which is only the first stage of another development of the disease, which may very soon go on to consolidation. Counter-irritation to the chest walls by means of a liniment such as that of soap liniment and turpentine, applied with gentle friction from time to time, on that portion of the chest easily accessible, is desirable. As to the ice bag or cold compresses to the chest walls, these I disapprove of absolutely, and in no case do I prescribe them, despite much favorable report from prominent physicians.

Poultices I also disapprove of as a rule. They are cumbersome, hard to manage, and while they give temporary comfort, their disadvantages are many and serious. When there is much pain locally, unrelieved by liniment and friction, I make use of dry

cups, the electric pad, hot water bag,[1] or a small hypodermic injection of morphine and atropine. One or two leeches are also useful, but they are annoying to the patient and should be reserved for relief of the right heart when it becomes engorged. Applied then inside the apex of the heart or under the right lobe of the liver, six in number, they are often invaluable and will save a fast ebbing life, when other means without them are vain. I consider the profession owes a debt of gratitude to Dr. D. B. Lees of London for his well-timed insistence upon this important fact. Of course venesection may take their place and does—a fact to which I have directed attention many times with what force I could command.

The old time method of abundant and repeated blood letting was radical and bad; the modern method of ignoring blood letting is not infrequently equally bad. In a strong, robust, full-blooded man, it does in the way of relief what nothing else will. In the case even of a relatively weak, pale, nervous man or woman or child, when the epigastric heart beats are pronounced, the jugulars distended and even pulsating, and the second sound of the heart is losing its snap or accentuation, then bring in a few

[1] Heat over the region of the heart by either pad, or hot water bag, is a valuable stimulant to impaired cardiac power.

leeches locally and their almost immediate effect to relieve dyspnoea, quiet and diminish the number of pulse beats and relieve great restlessness, is nothing less than magical.

Formerly, I made intravenous saline injections or hypodermoclysis after venesection. Now, I confine myself to a saline injection by the lower bowel, if required for stimulation or simply to add to the fluid constituents of the blood and thus perhaps to lessen the intensity of the pneumonic toxemia.

Fever, as a rule, should not be combated directly, but if seemingly required, we may attempt moderate reduction of temperature with sweet spirit of nitre, or spirits of mindererus. Quinine in tonic doses is also useful and may, and probably does, act at times efficiently to combat the noxa of the disease.

Alcohol, or vinegar, and water, made use of for tepid or cool sponging of the limbs, especially the legs, thighs and feet, promotes comfort, quiets restlessness and may, perhaps, lessen indirectly temperature. In the same way, an ice-bag to the forehead or scalp, properly supported and light in weight, is also useful with some patients, to soothe an irritated brain and promote sleep. The coal tar products, such as antifebrin, antipyrin, and phenacetin, should

not be given, either to lessen temperature or to promote temporary comfort. In my judgment, they do much harm, even in moderate doses.

How effectually to give some patients the sleep they long for and need urgently, and yet not do them great and immediate injury, is to me, as yet, an unsolved problem. The best that may be done is with the hypodermic syringe and making use of morphine and atropine—but *never* except in minute or very moderate doses.

The next best thing to try is the internal use of the mixed bromides. Whenever the breathing is much embarrassed, and especially when it is the lungs which are seemingly the primary cause of it in great degree, free use of compound oxygen inhalations are of untold value. When I say compound oxygen, I merely mean oxygen with a certain proportion of nitrogen, to make it less irritating locally to the bronchial tubes.

Meara[1] refers to Magnus Levy in a commendatory way, apropos of the value of oxygen in the following terms: "He calls attention to the restlessness and the convulsive efforts of the respiratory muscles in dyspnoea, which muscle effort, as I have tried to emphasize in considering the meaning of rest, increases greatly the demand

[1] N. Y. Med. Jour., Jan. 8, 1910.

for oxygen. The inhalation may break this vicious circle and induce rest, and that is exactly what morphine does and accounts for the brilliant results we so often see following its administration in dyspnoea."

In order to avoid the terrible mishap of a threatening heart clot, I advise lemonade as a refreshing drink, or citrate of soda in the milk, or an occasional dose of aromatic spirits of ammonia, with or without a few drops of tincture of nux vomica.

For a weak or failing heart, the best old brandy and coffee are primary. They are also helped greatly with best coca preparation, with tincture of strophanthus and also with caffein citrate, given with good judgment consecutively or alternately.

Young people and people up to, or perhaps fifty years of age, are occasionally helped with some form of digitalis. After forty or fifty years of age, I am now afraid of it almost invariably unless accompanied or followed by nitroglycerine. In appreciable doses, it often upsets the stomach and increases the work of the heart by its contracting action on small blood vessels. If I give it at all, I prefer the best tablet triturates, crystallized digitaline—or where there has been old, preceding heart disease, mainly dilatation, Trousseau's diuretic wine. It should be remembered, if crystallized digitaline be

given, that the doses must be much smaller than those of the amorphous form. To begin with, not more than the fourth of a milligramme is safe, until the personal susceptibility has been tested.

I have not spoken of strychnine in pneumonia, simply because in the last year or two, I have come greatly to distrust its value as a heart stimulant and rely much more upon strophanthus and caffeine, either by mouth or if need be, hypodermatically.

It is important to add that hitherto it has always been difficult precisely to determine when it was wise to commence giving cardiac stimulants in pneumonia. By some it is stated that they should be given previous to the heart showing any evidence of weakness. Others think it is ill-advised and only vaunt their use when this weakness is already shown in one or more ways, as for example, a developed blowing murmur at apex, systolic in character, or simply muffling or weakness of the first heart beat, or lack of accentuation of pulmonary second sound, or weakness, rapidity or irregularity of radial pulse beats. But even when it was determined proper to begin the use of stimulants or direct cardiac tonics, it was equally difficult to know accurately what doses to prescribe or when to diminish or stop their use, with greatest advantage to the patient. At

present, we have perhaps a more promising outlook in the skilled and careful use of the sphygmomanometer, if Gibson's statements be further corroborated. He believes that with its proper use, the reserve force of the heart may be accurately estimated. He further states that when the rise of the column of mercury in millimeters is persistently greater than the number of the radial pulse beats per minute, the outlook for the patient is favorable—in other words, under judicious treatment they, the patients, will and do almost invariably recover.

The converse is also usually true—namely, that with lower arterial pressure estimated in millimeters on the sphygmomanometer than the number of pulse beats, the patient will usually die. To this he has found one exception in fifteen cases of pneumonia, carefully observed. I am now having this statement of Gibson carefully verified, and I should become convinced of its value when I have further valuable facts from one or more experienced observers who take cognizance of and give due appreciation to the many pitfalls which we now know may be attached to the use of the sphygmomanometer—at first and for quite a while, regarded as an instrument so simple in its application, that any member of the hospital house staff could very soon

make reports of his observations with it, that we might regard as accurate and important. We now know differently.

Among the complications of pneumonia, one of the gravest is oedema of the lungs. Remedially, it calls for active stimulation or the use, moderately, of morphine and atropine hypodermatically. Leeches, locally applied, are also occasionally valuable to relieve an imminent condition. Abdominal meteorism may likewise become a very grave and threatening symptom. Turpentine stupes, or turpentine by rectum in enema is the best local treatment. Internally, nux vomica or ignatia may be given with some advantage.

Delayed resolution is best combated by counter-irritation, tonics, and later, change of air.

As to sera and vaccines, up to date, I know of none that practically have borne the tests sufficiently to justify confidence in their curative efficacy.

In no disease is it more important than in pneumonia to have the almost constant, watchful care, not of the learned scientist, laboratory expert, or even great consultant, but the judicious, self-sacrificing and practically invaluable help of the experienced doctor, who has tended and cheered many a case of pneumonia, which except for him would *not* have come safely through the severe ordeal.

The sooner we all learn to recognize in this disease above others, that the character and qualities of the attending physician are above price, the better for the patient, the friends and the relatives.

With two good, self-reliant nurses, who fill well their role, but don't transcend it, and the absolute confidence and non-interference of others, and willing, unquestioned obedience on all hands, the patient stands his best chance to recover from a very serious disease for which at the present time, unfortunately, we have absolutely no specific remedy. Each and every case is a law to itself in one or more directions, but here horse-sense is invaluable, when annexed to a skilled physician's care and *dutiful,* trained nursing.

THE TREATMENT OF PNEUMONIA.

BY

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The very wide difference of opinion as to the possibility of successfully aborting or even treating pneumonia existent in the profession today is due very largely to the fact that while one practician applies, with indifferent results, certain antiquated but "authorized" remedial measures to such of his patients as present the classical symptoms of the disease, expecting congestion to be followed by red hepatization and that condition by gray; the other, and more successful therapeutist, ignores alike set prescriptions and the named disease and sets out at the earliest possible moment to correct the pathological conditions present in the individual.

The one practician may acknowledge that the patient "presents every sign of an

on-coming pneumonia" and institute treatment of an expectant character BUT his teaching leads him to withhold a definite diagnosis until the disease has run its definite course—under a rather indefinite and decidedly limited medication. This gentleman has been told—and still reads that pneumonia is "an infectious disease running a well understood and self limited course," i. e. certain pathological conditions MUST obtain, one after another, and there is no power in drugs to prevent (or even materially modify) the same. So, the more profound the pathological knowledge of the physician the weaker his therapeutics or, in other words, the more classical and scientific the doctor the less opportunity has his pneumonia patient to get rational *treatment.* At first sight this may seem an absurd and libelous statement but unhappily, in this instance the truth is greater than the libel and a few moments' consideration of the position assumed by the so-called leaders of the profession will prove that fact conclusively.

The era of therapeutic nihilism through which we are passing is without question also a transitional stage; the average mind accepts that which is obvious together with such statements as may emanate from authoritative sources. Hence, the modern clinician, taught by men (who having none

but unsatisfactory drugs to work with secured but uncertain results) that medicines are not to be depended upon goes his instructors one better and calls drugs "useless"—as indeed, many of those he is familiar with *are!*

Moreover, he has done an immense amount of laboratory work and dissected many cadavers. Now, the gross pathology of pneumonia is obvious enough; there is no mistaking the profound changes which occur in such vital organs as the lungs and the microscope, bearing a "particularly beautiful" slide tends further to convince the student that such conditions *could not possibly* be affected beneficially by mere medication. Then come the autopsies on hospital patients who died from this dread and "self-limited" disease.

What does the medical student see? Conditions which would inevitably (as they did) render life impossible.' What *is* the use of wasting time then in listening to those deluded individuals who talk about "effective treatments" for pneumonia? Why burden one's mind with useless detail relative to the action of perfectly useless drugs or gather information regarding the therapeutic procedures of the uninformed? The college and laboratory trained man of 1910 deals with *facts* not theories—at least, with some facts and a good many theories

so disguised—handed down from the age of mysticism by preceptors who learned their therapeutics from cheerful gentlemen who "puked, purged and bled"—and scoffed at the idea of vehicles propelled by steam, to say nothing of automobiles and airships.

But now, as then, "the world moves"—lately, with wonderful celerity, and that which "was not" yesterday, today IS. Physicians more eager to cure than pose as savants have refused to look upon a live patient and a cadaver as similar material and accepting literally the injunction to "heal those that be sick," persist in doing so, believing that the Almighty who has provided for the repair of shattered bone and tissue also intended that an inflamed and congested lung, when intelligently cared for, should regain normal conditions.

This species of doctor recognizes fully his limitations and extends a hearty meed of praise to such of the brethren as toil with scalpel, test-tube and microscope, for through them he has learned wonderful things; but he also sees that "much learning has made them (therapeutically) mad" and unable to distinguish clearly between a section of pathological tissue and a sick man. So he learns from them whenever and wherever he can, and with a better understanding of pathology practices a more

precise therapeutics. He has too (thanks to the chemist) positively efficient drugs to work with; he knows that a small dose of an active principle, repeated at short intervals, will inevitably produce certain definite results, remedial or physiological. He realizes now, as never before, the fact that a disturbed body chemistry underlies most diseases, and knows that a system loaded with toxins originating in a foul intestine can never resist invading bacteria.

To differentiate definitely; the one physician is a diagnostic bacteriologist and pathologist (peculiarly the latter) while the other is all these *and a therapeutist,* possessed moreover of a knowledge of his materia medica which enables him to perform every-day what, to "the other fellow" appear "impossibilities."

As a matter of fact the rational treatment of pneumonia is very simple; the patient does not present himself to the doctor, as a rule, when the pathological processes are at their height but shortly after or during the occurrence of the prodromata. At this stage of the disease *proper* medication produces a prompt and profound effect; indeed, if the doctor is able to recognize the abnormal conditions present in the individual and administer the *right* remedies therefor he will materially modify, if he does not put an end to, the disorder.

To treat "pneumonia" will not do; to institute routine procedures is entirely useless, but naturally, certain fairly constant conditions will be observed and these almost always yield to the same remedial measures. The claim that pneumonia can be "aborted" has been fiercely ridiculed, and the men making it are called "ignorant," "impostors," quacks, etc., etc. Yet day after day these men gain in prestige and practice and show, as year succeeds year, a lower pneumonia mortality rate. Practicians who frankly state that five years ago they lost at least one out of every three cases now feel chagrined if they lose one patient in twenty. A clear idea of the conditions they have to deal *with,* and familiarity with definite remedial agents and methods, have brought about the change.

The writer having been among the first few who urged the curability of pneumonia cannot but feel elated to note the rapidly growing acceptance of this important truth among the rank and file of the profession. Even the latest text-books on "Practice" refer in hopeful terms to the efficacy of medicinal measures. Wilcox says, "Taking everything into consideration the treatment of pneumonia is *especially* satisfactory."

A. H. Smith in a most scholarly and practical article upon pneumonia in the "Reference Handbook of the Medical

Science" states, after recommending the use of certain drugs: "the substitution of lysis for crisis in a large majority of cases is a very remarkable result of remedies of this class and demonstrates the *power they possess to modify the usual course of the disease.*"

This is just what we have so earnestly upheld; provided we know just what conditions exist and have at our disposal positively-acting remedial agents which will produce definite and desired effects upon the living body we *can* "modify the course of a disease"—yes even control and often, *abort* it. Just as long as we try to treat "pneumonia"—the named disease—with a selection of formulae devised and advocated by men eminent in the profession, before even the cause of pneumonia was clearly understood, we shall fail (even as our ancestors failed) and, to cover our own incompetency, will term the disease "self-limited." Ignorance—especially in high places—is ever intolerant: Wisdom does not hesitate to embrace truth even though she has to step down from her pedestal to do so.

It would be superfluous to describe the symptoms or course of a typical lobar pneumonia; every physician knows that it is an acute infectious disease in which the micrococcus lanceolatus or the B. pneumoniae—

or both bacteria together—invade the air cells of one or more pulmonary lobes where they propagate in a fibrinous exudate from the capillaries and produce a toxin which infects the entire system. Moreover, that portion of the lung which is involved becomes impervious to air and the body is deprived of a large proportion of the oxygen necessary to maintain life. The classical symptoms—chill, fever, dyspnea, expectoration of rusty sputum and severe prostration—evidence plainly to the observant clinician the conditions which exist.

But in order to correct them—to treat the patient effectively—it is necessary to remember that the invading bacteria are omnipresent and become dangerous only to the individual presenting conditions favorable for their propagation. The normal individual may be the host of numerous B. pneumoniae; streptococci, staphylococci, *et hoc genus omni,* may exist *pro tem.* in his respiratory passages but he does not contract pneumonia. There must be lowered resistance—an autotoxemia—first, the pneumonia is distinctly a secondary derangement. Once we recognize this fact we shall naturally strive to eliminate at the earliest moment possible all the undesirable matter the body contains: We shall, while eliminating, administer systemic antiseptics and increase leucocytosis as quickly as we

can. If the body with a normal chemistry can escape pneumonia then the body already infected will most certainly repel the invading germs and neutralize the toxins emanating therefrom, provided we intelligently aid in the restoration of normal conditions.

The physician who is slowly but surely passing away gave fearful and wonderful medicines, said to "be good for" certain diseases; too often he failed to reach the disease but in trying to do so destroyed his patient. The precise therapeutist treats *patient,* re-establishes the equilibrium of the deranged vital processes and *cures disease.*

As I have already pointed out we know almost precisely the conditions which exist in a pneumonia patient. Knowing this and knowing as clearly just what certain remedial agents will accomplish, it is comparatively a simple matter to outline an effective treatment.

Carelessness or over-certainty is, however, as fatal here as anywhere else; one individual, presenting perhaps the same gross symptoms as the next, may require materially different medication.

Grave complications not infrequently exist. An overtaxed heart may require immediate support; renal congestion may have been present for some time and the

system may be literally swamped with metabolic waste. Hence, in every instance, the first examination should be minute and the urine, feces and blood forwarded to the nearest laboratory. The report of the pathologist will materially assist the physician in securing results. It is well to remember that after the first forty-eight hours the chlorides in the urine are greatly reduced—sometimes even entirely absent. More or less albumin will be observed during the height of the disease.

The physician who has failed to keep up his physiological and anatomical knowledge must remember also that the lungs have a dual circulation therein differing from every other structure. The bronchial arteries supply the *nutrient* from the left side of the heart while the pulmonary supplies the *functional* from the right heart. To comprehend the phenomena observed in pneumonia one must realize the existence of this condition.

The main essentials of treatment in a case seen during the congestive (first) stage are: To relieve the local congestion. To secure prompt and thorough elimination, via bowel, kidneys and skin. To produce as rapidly as possible, intestinal and systemic antisepsis. To maintain vitality of the patient and increase his resistance. To secure and maintain cleanliness of the

nares, buccal cavity, and upper respiratory tract.

None of these things are difficult to accomplish and quite frequently after twenty-four hours of forced elimination and exhibition of antiseptics the fever modifies, circulatory equilibrium is established and the whole train of ominous symptoms disappear.

The method of procedure which has proven most successful is outlined in detail herewith. It must be borne in mind however, that perfect results are only secured by adherence to a perfect technique and that "medication must always be modified to meet the conditions present in the individual under treatment."

Prophylaxis. As many of the victims of pneumonia attribute, and rightly so, the onset of their case to an exposure to cold, it is evident that such exposures should be avoided. And this is especially true in those whose body resistance is lowered through sickness or excesses of any kind. More careful attention to the ordinary "colds" should be sought as the mucous membrane during such attacks furnishes less resistance to the entrance of infection. The aged should be watched carefully during their winter cough or in attacks of bronchitis which might be trivial in those of younger years.

Plenty of fresh air, especially in sleeping quarters will do much to minimize the danger of pneumonia.

The sputum of afflicted patients should be burned and if in a hospital the patients isolated.

GENERAL HYGIENE.

The Sick Room. The proper care of the patient's environment is very essential. The room should have a southern exposure, thus admitting plenty of sunlight. There should be many windows which remain open night and day. Fresh air and plenty of it is the main consideration in the treatment of pneumonia. For it is upon the adequate supply of oxygen that the comfort and indeed the life of the patient depends. The temperature of the room should be kept at about 60° F. Fresh air is essential but draughts must not be permitted. There is no question of the usefulness of medicated steam; a small vessel of water in which a few drops of eucalyptol, or oil of pine, or Scotch fir, have been dropped can be kept boiling over an alcohol lamp. The medication must be renewed from time to time. Except in the coldest part of the year I would recommend the out-of-doors. A sheltered porch is desirable. The coldness of the air is not a detriment but a positive help in soothing and yet invigorating the patient. Undue draughts in a room may be avoided by tacking cheese cloths across the open windows.

The bed should be firm and smooth with the sheets pinned down to prevent crumpling. To maintain an even heat within the

bed it is a good plan to spread papers beneath the mattress and keep a hot water bottle at the patient's feet. Light, warm comforts should cover the patient while the clothing should consist of a light flannel night shirt which opens down the front to facilitate the examination of the chest. All unnecessary furniture should be removed.

As regards the personal hygiene of the patient the mouth and nose should be cleansed daily with a boric acid or alkaline antiseptic solution, especially should these parts be cleansed before taking medicine or food. The genitalia should be kept scrupulously clean. Care should be taken in the use of the bed pan that the patient does not have to strain. Let the visitors be few and the nurse one who is firm and quiet.

Hydrotherapy. In the early stages of the disease when there is severe pain in the chest the use of the hot water bag or a hot chest pack is indicated. The dilatation of the blood vessels obtained thereby relieves congestion. Some physicians prefer applying a hot kaolin paste in a fairly thick layer over the chest, first previously applying to the skin of the chest a little guaiacol and camphorated oil, equal parts. In some cases I have preferred this to the chest pack, but not in the majority of cases. If the kaolin paste is applied it should be covered with a layer of cotton or a snugly-fitting thin undershirt. Later, during the height of the fever, a cold sponging is soothing to the patient and reduces fever. The sponging should be done daily, even if the temperature be not high, for the purpose of cleansing the emunctories of the skin and removing toxins in that way. For reducing the temperature the applica-

tion of the cold chest pack is one of the surest and most rational methods. The pack can be applied in the following manner. Several thicknesses of soft linen are cut of a size to reach more than around the body and to extend from the clavicles to the umbilicus. A cut is made so they may fit under the arm at the shoulder and flaps are made to come from the back over the clavicles. Two pieces of soft flannel are cut of similar size and shape. Two of the linen cloths are wrung fairly dry from water of 50° to 60° F. temperature and applied to the body with one of the flannel cloths on the outside. The flaps are brought over the clavicles and the whole jacket pinned down the front. Such a pack may be renewed whenever it becomes warm from the body heat. Some patients may not react well to the cold pack, as evidenced by cutaneous blueness and shivering, and the temperature of the water will have to be higher: i. e. 70° to 80°.

Whenever there is intense congestion of the chest with an accompanying cerebral congestion a hot mustard foot-bath will determine the flow of blood to the lower extremities and help to give relief, along with certain drug medication to be described later.

Dietary. As in all acute fevers milk is the best food, for it contains the fat, proteid and carbohydrate molecules so essential in the body economy. To raise the caloric value of the milk, milk sugar with a value of 120 calories to the ounce may be added so that the patient is not nauseated with the amount of milk alone needed to supply his daily need of 2,500 to 3,000 calories. Buttermilk, kumiss or peptonized milk can be given if more acceptable to the patient.

Grape juice, meat broths, soups, whey and cereals may all be added to the list if relished by the patient and are well borne by the alimentary tract.

Eggnogs form a very suitable food, more especially during and following the crisis as well as during convalescence.

Water should be given generously and to insure a definite amount should be given at definite intervals. Lemonade or mild aperients are generally agreeable to the patient and are of value for their mild diuretic or laxative effects.

In the majority of cases of pneumonia it is necessary to cleanse the intestinal canal thoroughly and quickly. This can be best accomplished by giving calomel gr. ⅙ and podophyllin gr. ⅙ at half hour intervals for three hours and an hour after the last dose a full teaspoonful of effervescent magnesium sulphate should be taken. This saline draught may be repeated with advantage in 24 and 48 hours.

If it be possible, hot water should be used. In some cases it is well to give the salts dissolved in a small quantity of cool water (not *cold*) and follow immediately with a draught of plain hot water.

To relieve the local congestion, three drugs exhibited conjointly prove preeminently efficacious. Aconitine, digitalin (germanic-pure) and veratrine are exhibited half hourly or hourly till the skin moistens, temperature falls and the pulse rate reaches 80 or below.

The usual dosage for an adult is gr. 1/134 amorphous aconitine (or 1/500 crystalline aconitine), gr. 1/134 veratrine, and gr. 1/67 digitalin; children over twelve may receive half the above dose for six doses then one-quarter the amount. Chil-

dren under twelve but over five one-quarter at first then one-eighth. Patients under five one-eighth from the first; this dosage may be reduced still further as results are secured. In *asthenic* cases strychnine gr. 1/67 is substituted for the veratrine. Either combination may be secured in granule form and so exhibited or solutions may be readily prepared. Aconitine and veratrine are more serviceable during the first and beginning of the second stage of the disease.

If the bowels are known to have been sluggish an enema of warm salt water should be given before the medicine acts. If it is retained for a short time so much the better.

After the bowels have moved once or twice the patient receives every three hours, five to ten grains of the triple sulphocarbolates (lime, zinc and soda); a draught of water is ordered with each dose.

Nuclein, ten minims, is exhibited hypodermically once or twice daily as the severity of infection may demand; if the patient is aged or weakly or the disorder somewhat advanced it is highly desirable to induce a hyperleucocytosis as rapidly as possible and I do not hesitate to give fifteen or even twenty minims night and morning. In lighter cases ten minims subcutaneously once a day and an equal quantity absorbed from the buccal mucosa every four hours will suffice.

Chest pains which may at first be severe usually yield to two or three doses of bryonin (gr. 2/67) and hyoscyamine (gr. 1/250); or if necessary in extreme cases morphine 1/8 to 1/4 gr. hypodermically as a matter of fact, after the bowels have

been evacuated and the defervescent begins to act, comparative comfort obtains in most cases.

These are the simple and thoroughly effective therapeutic procedures called for in nine out of ten pneumonia cases. It is essential to secure rest, quiet, elimination and defervescence; to increase the natural resistance and render the tissues and fluids of the body inimical to the welfare of the invading bacteria. These things we can accomplish perfectly by taking the steps described; and very frequently no other medication will be required.

It must be borne in mind that the amount of drug which will suffice in one case will not do the work in another. Hence it is necessary to push the aconitine, veratrine (or strychnine) and digitalin combination till defervescence *is* secured. The same thing applies to the eliminants. If free stools do not follow the six doses of calomel and podophyllin or if the patient is in the habit of "taking medicine for his bowels" double the dose or repeat exhibition till desired effects are obtained.

Usually by the second day the cough is fully developed and a stimulating expectorant cough mixture may be required, such as the following ℞:

Ammonium Carb. 10.0
Syrupi Tolutani 20.0
Inf. Digitalis 60.0
Mixt. Glycyrrhiza comp. q. s....240.0
M. Sig: 16 cc. every 3 hours.

If cough be excessive codeine sulph. gr. 1/12 and Syrup of Dover's 10-15 minims may be added to each dose. As to the value of digitalin here that will be discussed under cardiac symptoms.

An icebag to the head allays cerebral congestion and the accompanying headache.

When there is restless insomnia a hypnotic is indicated to obtain needed rest. The depressant hypnotics should be avoided. Veronal gr. XV or Sulphonal gr. X. given in a warm drink and repeated in two hours may suffice.

The condition of the kidneys should be daily noted and small doses of the alkaline diuretics given, such as potassium acetate or citrate gr. XV t. i. d. in a full glass of water. If there is an existing nephritis, strophanthin or digitalin may be indicated for their influence on both heart and kidneys. The caffeine group of diuretics are very useful in these cases, notably the sodium benzoate of caffeine in large doses. If marked uremic symptoms occur great benefit can be derived from venesection. Fluid diet only, should be permitted. Alcohol, if used at all should be administered with great caution. I am convinced that when the kidneys are badly involved in cases of pneumonia alcohol should not be given.

SPECIAL INDICATIONS.

Cardiac Complications. Owing to the pulmonary congestion the increased work thrown upon the heart is enormous and our chief concern in a majority of the cases of pneumonia should be as to the heart's ability to stand the test. It has long been a mooted question as to when cardiac stimulants are indicated. I am of the opinion that after the congestive stage the heart's muscle should be strengthened and quieted. It does not seem advisable to wait until signs of weakness or collapse ap-

pear before administering cardiac tonics or stimulants.

For its sustaining and strengthening effect on the cardiac muscle digitalin given in small repeated doses, is primarily thought of. Strychnine in dosage of gr. 1/40-1/30 t. i. d. is a valuable cardiac stimulant and in many cases more efficient than digitalin. As regards the use of alcohol I feel that its value is chiefly in replenishing tissue waste or rather preventing it. It is a good diffusible stimulant although not a cardiac stimulant per se, and performs especial service in the patients addicted to its use. Here it is best given in the form of whisky from 2-3 ounces in 24 hours. Alcohol, however, should be reserved for an emergency to tide the patient over a critical period. Alcohol generates no new force but only enables a patient to draw easier from his reserve power. Its administration should be discontinued as soon as the effect desired is obtained.

If signs of cardiac collapse appear such as weak thready, possibly imperceptible pulse, with cold, clammy sweat rapidly acting cardiac stimulants are indicated, such as ammonia, the action of which drug upon the nasal mucous membrane is quickly conveyed reflexly to the heart long in advance of direct action from absorption of the medicine. Ether hypodermically stimulates quickly and effectively as does camphor. Venesection is of great value when there is overfilling of the right heart. In other cases of myocardial insufficiency digitalin and strychnine are the best remedies. It is well to remember, however, that *active* stimulation is not indicated when compensation is undisturbed and should be

postponed usually until the crisis or just preceding it.

Meteorisms. A very common condition in pneumonia, very distressing to the patient and often intractable to treatment. In guarding against this symptom appearing the patient should have free movement of the bowels daily by using calomel and salines. Foods which produce fermentation in the alimentary tract should be avoided. The intestinal antiseptics are indicated also. If the condition is present turpentine stupes should be applied to the abdomen and enemas of turpentine and water or milk of asafoetida and water given. Eserine gr. 1/10 hypodermically will stimulate peristalsis in the musculature of the gut and assist in expelling gas.

Respiratory Complications. If the respiratory center becomes paretic, free elimination to overcome the toxemia, full doses of strychnine hypodermically and inhalations of pure oxygen are invaluable. In administering the oxygen no mask should be used, for it is not advisable to allow the oxygen to be inhaled directly or too rapidly. If properly administered the respirations will be slowed, increased in depth and strength and cyanosis will disappear. The effects must be the guide for the quantity used and the frequency of its administration.

Should edema of the lungs occur dry cups should be applied to the affected side or venesection with the hypodermic administration of powerful heart stimulants, such as digitalin, strychnine, ammonia, ether, etc. Hypodermics of adrenalin, 1 to 10,000, are of great value in this condition.

Pneumonia of the Aged. In a general way the treatment is the same as heretofore outlined. There are certain precautions, however, to be remembered. The heart must be carefully watched and its strength maintained by strychnine, strophanthin or alcohol. Old people are usually benefitted by the moderate use of alcohol. Digitalin is ordinarily contraindicated in these cases. External applications should be tepid or warm. The diet light and easily digestible. If the bowels are inactive they should be moved by means of suppositories or enemas. Laxatives should not be given. Catheterization should be resorted to if necessary. Free ventilation is necessary, but old people cannot endure the cold air so beneficial to younger patients.

Crisis. Support the heart with strychnine hypodermically or other rapidly acting stimulants. Here large doses of strychnine must be given. I have given gr. 1/15 hypodermically every three hours to an adult in the crisis of pneumonia.

Empyema. Aspirate and if abscess of any size resect one or two ribs and drain. Give tonics and restoratives.

Delayed Resolution. Fibrolysin may be tried, lung exercise, fresh air and good hygiene.

When the pleurae are markedly involved it is well to give bryonin and asclepedin together every two hours till improvement takes place. The patient should receive nothing but milk, barley water, fruit juice and water or clam bouillon for the first few days. Barley water with a little lemon juice added is the safest beverage and the most pleasing to the patient. It should, however, be properly prepared.

When the acute symptoms have subsided it is desirable to give for a few days guaiacol carbonate, calx iodata and nuclein. The proportions I have found most satisfactory are guaiacol carb. gr. 1, calx iodata ½, nuclein gtt. 10; one such dose is ordered every four hours. There is no doubt that resolution is markedly hastened by the use of this formula. Later as tonic reconstructives are indicated the triple arsenates (iron, quinine and strychnine) should be substituted.

Convalescence. Patient should remain in bed following crisis until there would seem to be no danger to the heart in arising. This may be one week following or three, depending upon the severity of the attack and the recuperative power of the patient. Iron, arsenic, nuclein or the triple arsenates of iron, quinine and strychnine or other tonic restoratives should be given and patient should remain out of doors in the fresh air and sunshine as much as possible. Change of climate may materially cut short the convalescence. The condition of the appetite and digestion must regulate the quantity and kind of food given. Nutrition must be improved and body weight increased but efforts to unduly force matters in these directions are unwise. Worry, care and excitement should be avoided.

THE USE OF VACCINES IN THE TREATMENT OF PNEUMONIA.

BY

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The theory of bacterial vaccines is that in bacterial infections the infected body absorbs bacterial substances and products. According to the amount of bacterial substances and products absorbed, immune substances are produced. When much is absorbed, sufficient immune substance is usually produced to cure the disease, but when little is absorbed, not enough immune body is produced to cure the infection, which then becomes chronic.[1]

Acting in accordance with this theory, an appeal[2] was made to the medical profession of Massachusetts by Dr. Timothy Leary, of the Tufts College Medical School, having as its object a collective investigation of pneumo-bacterin for the purpose of determining its value in the treatment of lobar pneumonia. This appeal was made after three years' experience in the use of bacterial vaccines by Dr. Leary.

Before taking up the subject, the author placed the bacterin in the hands of several groups of medical men and obtained reports of 83 cases. Pneumococcus vaccine was furnished for the treatment of 34 cases of the alcoholic type, of whom 6 died (17.7%). In a larger series of cases of ordinary pneumonia (49) 15% came to a crisis in 3 days, and but 2 deaths were reported. The total deaths for the series of 83 cases were 8, or 9.7%.

For the purpose of obtaining data from a sufficient number of cases to furnish material for a definite conclusion, Leary states that a fund was established through the munificence of public spirited citizens, by means of which he was enabled to furnish pneumococcus vaccine without cost to physicians in Massachusetts desiring to take part in the collective investigation of this product.

Especial attention was called to the following important points:

1. Early diagnosis. Do not wait for the appearance of rusty sputum.

2. Early administration of pneumo-bacterin. "Use the vaccine treatment the moment that a diagnosis is established. The function of vaccine treatment is to stimulate the immunizing machinery of the individual to react and produce substances (opsonins) which will influence the bacteria by preparing them for ingestion. The patient plays an active part in the process,

and if success is to be obtained must have sufficient resisting ability to react under the stimulation of the vaccine.

3. Necessity of full doses, 10,000,000 to 50,000,000, progressively increased in acute cases, every 4 to 8 hours. The negative phase is either ephemeral or absent.

4. Harmlessness of the vaccine treatment.

After receiving quite a large number of reports from the profession in various parts of the state, Dr. Leary changed his doses to 100,000,000 of killed bacteria once in twenty-four hours.

Willcox and Morgan[3] state that they have treated 24 cases of acute pneumonia with bacterins. They administer 20,000,000 to 50,000,000 stock pneumococci as soon as the patient goes under treatment. After forty-eight hours, a second dose is given if it seems necessary. After this the autogenous vaccine is used if further doses are indicated. It was found best to decrease the dose as the patient approached the crisis, as he became more susceptible to inoculation at this time. In many instances there was a fall of temperature immediately following inoculation, and the dyspnea and delirium became less. The duration of the disease appeared to be shortened, the crisis occurring before the usual time in 6 cases. The temperature in 8 of the cases fell by lysis instead of crisis.

The benefit was most pronounced in those cases which ran protracted courses.

MacDonald[4], Martyn[5], and Batten[6], report excellent results from the bacterin treatment of pneumonia.

Coleman[7] reported a case of unresolved pneumonia of 38 days standing. Two injections of 45,000,000 cocci each, given at an interval of ten days, brought about complete resolution.

Briscoe and Williams[8] conclude that in the more or less acute conditions following lobar pneumonia, the bacterins cause marked improvement in the general condition.

Floyd and Worthington[9] report a series of cases treated with bacterins.

Dr. George W. Ross[10] stated that patients with pneumococcus empyema, sinuses, etc., have been successfully treated.

Jowers[11] reports a case of recovery from peritonitis, due to pneumococcus infection of the tube.

Dr. Helen Putnam[12] reports a case of abscess of the antrum of Highmore, from A. E. Wright's clinic, in which two inoculations at an interval of seven days, cured the condition entirely.

Beebe and Medalia[13] report favorable results with the use of pneumo-bacterin.

Dr. Allen[14] reports a series of cases in which bacterin treatment was used with

success in treatment of diseases of the eye, one of the most serious cases being ulcus serpens corneae.

Goadby[15], in an article on "Vaccine Treatment of Pyorrhea Alveolaris," states that he has treated 47 cases by pneumo-bacterins. Of these 36 were cured; that is, all the general symptoms cleared up, together with the local suppuration. Nine were relieved; that is to say, the general symptoms disappeared, although the local discharge remained.

Leary[16], in an article on the bacteriology of pyorrhea alveolaris, states that he has studied about 100 cases of pyorrhea and has found a great variety of organisms, his most constant finding being the pneumococcus. Streptococcus was also frequently found, as well as staphylococcus, the latter, however, commonly associated with the pneumococcus or streptococcus. Mixed infection often requires mixed vaccines, therefore he used in these cases stock pneumo-bacterin, to which a stock strepto-bacterin and a stock staphylo-bacterin had been added.

Medalia[17] found about 90% of his cases of pure pneumococcus infection, with which staphylococci and streptococci are more frequently associated than any other organisms. The injections ranged from 30,000,000 to 150,000,000, combined with

from 150,000,000 to 500,000,000 staphylococcus aureus bacterin. Thirty-three cases have been under treatment, 11 of which are entirely cured. Five of these have remained over a year without any recurrence. All the others have shown great improvement.

CONCLUSION.

It would seem from the above evidence that the pathological conditions resulting from an acute pneumococcic infection can be relieved, removed, or modified, by injecting subcutaneously killed bacteria of the species causing the diseased condition. The collective investigation now under way in Massachusetts is attracting the attention of the profession, and it is hoped that a verdict will be reached supported by sufficient evidence to make it conclusive.

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DIET IN PNEUMONIA.

BY

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The attempt to make the theoretical science of dietetics practically workable at the bedside, brings us face to face with a series of apparently conflicting problems. This is especially true in connection with pneumonia as we shall see a little later on in this discussion.

Some of the apparent conflicting conditions can be made to harmonize materially, while in other instances, it seems almost impossible to secure a satisfactory solution of this all important question, to wit, how best to feed the patient both in health and disease.

There are certain factors, however, which must not be overlooked in connection with this interesting study of dietetics in the treatment of the acute infectious diseases.

The two primary factors are the patient and the food to be utilized by the system.

Taking up first, the patient, we must recognize as a primary fact, that every disturbance in metabolism of an acute nature, is always preceded by a general lowering of the nutritive vitality. The next factor to be kept in mind is the fact that the general deterioration in nutritive activity must be followed by a localized lowering of the nutritive vitality in some organ or tissue of the body. In the acute or infectious diseases, this local deterioration must result in the establishment of a soil, presumably proteid in nature, that will sustain the specific micro-organism which produces the disease, as in the lungs in pneumonia. There is no question as to the necessity of the microbic influence in the infectious process. Just what part the micro-organism plays in the more chronic processes has not as yet been fully determined. This much, however, is true, that as an etiological factor its action cannot be so directly traced, nor the influence of diet so exactly followed.

In the acute process the micro-organism secretes directly a toxin, or by its growth within the tissues, so alters the oxidation reduction processes of the body, that various toxins are produced as the result of the imperfect transmutation of the proteid molecule. It is highly probable that

the toxins are produced in both ways, hence the great complexity of symptoms encountered. From a practical dietetic standpoint it matters little how the toxins are produced, the poison is there, and acts as a pronounced disturbing factor to normal metabolism. It causes the symptoms, arrests glandular activity, and must be destroyed and eliminated before a cure can be effected.

As a natural sequence of this toxic condition of the system, the digestive functions are still further disturbed, and we are confronted at the very start with digestion at its very lowest ebb, a decreased consumption of food, imperfect oxidation and an increased storage of heat within the body. This tends to destroy the very foundation upon which all repair must rest, the digestion and utilization of food, for medicine alone has no specific curative action.

Thus it becomes apparent at the very start of our dietetic treatment of pneumonia, that we have a very complex problem to solve. One which admits of a great variety of opinions. One which must vary with individual cases, and in accord with which one of the above etiological and pathological factors is playing the most important part.

Before attempting to outline the dietetic measures that will yield the best results in combating the above enumerated conditions, which relate directly to the patient, we must have a concise knowledge of the chemical composition, the digestibility and the caloric and nutritive value of the food stuffs that can be employed. We must know what can be accomplished with them under normal conditions. This accomplished we can direct their use with some degree of intelligence in connection with all pathological processes as well as in connection with pneumonia.

As regards their origin, all food stuffs are divisible into two general classes: vegetable and animal. These two are further divisible, chemically speaking, into four distinct classes, to wit: the inorganic which includes water and salts of various kinds; two classes of simple heat producing substances, one including cellulose, starch and sugar, the other composed of all kinds of fats; the fourth including the pure proteid and the proteid-like bodies, or the constructive, tissue-building protein compounds. For a still clearer understanding of the subject, this fourth class is divided into two: one including the purely proteid substances, the other the proteid-like compound, to which an atom of iron and phosphorous is attached in its synthetic formation. This latter subdivision or fifth class,

for convenience and a better comprehension of the subject, is classed as a hemoglobin- and lecithin-yielding one. This particular form of proteid-like substance is absorbed from the lumen of the alimentary canal into the enterohepatic circulation and conveyed to the epithelial cells of the hepatic gland, where it is oxidized into hemoglobin and lecithin, thus furnishing to the system these two much needed compounds. The hemoglobin thus formed replaces the daily loss, while the lecithin passes on to the nervous system, there to be oxidized in the protoplasmic masses constituting the nerve cells. When lecithin is oxidized in the nerve cells in this manner it yields heat energy directly to the cells of the central nervous system.

Outside the five classes here enumerated no others of importance are found in the food-stuffs.

Both the vegetable and animal foods contain these five essential classes, all of which are necessary for the maintenance of animal life. This being true, why is not one type of food just as available as the other? If it is not true, what advantage has one class over the other? These questions can be solved only by a close comparison of the relative proportions of the five classes as found in the two primary divisions, taken in conjunction with the demands of the

physiological economy for these five different groups of substances. Chemico-physiologic investigation has demonstrated that a certain amount of each of these five classes must be supplied daily to insure the best nutritive results. Water and salts, a sufficient amount of the purely heat-producing compounds, a certain amount of tissue-building or pure proteid material and the requisite quantity of hemoglobin- and lecithin-yielding material must be supplied. All this must be accomplished and still keep well within the oxygenating capacity of the system. In this connection it is well to note that, in health, nature permits a quite wide latitude between the possible intake of food and the oxygenating capacity of the animal economy. Were this not so, it would be impossible to maintain a perfect state of health. In connection with disease, however, this latitude between the intake of food and the oxygenating capacity of the system is often reduced to a very dangerous point, so much so, that it becomes one of the exciting factors in the maintenance of the pathologic process. Even with the largest possible latitude between the intake of food and oxygen supply, neither the vegetable nor animal diet alone, so far as composition is concerned, is absolutely perfect. The latter, however, so far as the human economy is concerned,

is more nearly perfect than is the vegetable class, as we shall see a little later in our analysis of the two.

Looking a little more deeply into the exact and comparative composition of the two classes it will be found that the vegetable class contains less water than the animal, while the salts are more evenly distributed between the two. The vegetable class contains a very high percentage of cellulose, starch and sugar, or glucose-forming elements; while the animal, excepting milk and its derivatives, is absolutely deficient in this respect. The vegetable class contains a very low percentage of fat, while the reverse is true of the animal foods. In the purely proteid group it is pretty evenly abundant in both classes. If there is any advantage as to quantity, taken as a whole, it will be found in favor of the vegetable class. With the fifth or hemoglobin- and lecithin-yielding group the advantage is largely on the side of the vegetable class of foods; in fact the animal class is deficient in this respect.

Having found these five classes in both the vegetable and animal foods, the next question is what are the requirements of the system as to the exact amount of each of these groups to maintain the highest grade of nutrition? Careful observation and close study of the chemistry and physiology

of the animal economy seem strongly to indicate the necessity for a continuous and quite uniform supply of each of these five classes to secure and maintain the best nutritive activity. This applies particularly to the last four classes, the glucose-forming, the fats, proteids, hemoglobin- and lecithin-yielding substances. If anything, it is more important with the last two of the four than with the first two; they being tissue builders, while the others are only heat producers. How the first three of this group of four—or the glucose, fats, and pure proteids—shall be proportioned, is the all important question.

If we turn to nature and the composition of milk, it will be found that the three are quite near together in percentage amounts, but with a slight preponderance in the glucose column. This correspondence is so near, taken in connection with the marginal latitude of deviation between the food intake and oxygen supply as allowed by nature, and the proportionately larger liver in the child, that milk furnishes an almost perfect diet. Further than this, it should be taken as indicating that these three groups should stand in all dietaries in pretty close percentage relation to each other during health and disease if the best nutritive results are to be secured. This is especially so in connection with chronic

diseases in which there is a low oxygenating capacity from any cause, and is further indicated by the necessity for resorting to a milk diet in the treatment of both acute and chronic diseases.

In my experience, the exact amounts of the three classes of food-stuffs which have given the best results are as follows: pure proteids 150 grams, fats 105 grams, glucose-forming elements 135 grams. Total, 390.

The above amounts, when fully oxidized within the body, yield 2145.15 large calories, and this is accomplished with a saving of twenty per cent. in the oxygenating capacity of the system.

With this understanding of the percentage composition of the food-stuffs, well illustrated in the comparative table of food-stuffs, and knowing the daily requirements of the animal economy as to heat production and proteid intake, our dietary is best classified, primarily, as purely vegetable or purely animal; neither one of which, as we have already seen, conforms absolutely to the requirements of chemicophysiology as understood today. The animal class, however, as already shown, comes very close to perfection, so much so, that it is the only supply during intrauterine life and also during the first few months of extrauterine existence. Owing, however, to deficiency

of hemoglobin- and lecithin-yielding elements in all animal foods, some form of vegetable compound which contains a higher percentage composition in this respect, must be added to the dietary just as soon as the digestive system has acquired sufficient strength to accomplish the more difficult task of digesting and assimilating food derived from the vegetable kingdom.

Again another radical difference between the two primary classes is encountered, one that is of vital importance in connection with the management of chronic diseases and should never be lost sight of in study of the economics of diet. This is true also in a large measure in the more acute processes and even in perfect health. The vegetable class is so constructed in its synthetic formation that it is very difficult of digestion, while all animal substances are easy of digestion. The difference is so great that from 16 to 80 per cent. of the vegetable foods pass through the alimentary canal undigested, while with the animal foods the loss ranges between 2 and 9 per cent. From this fact alone, it is easy to understand the greater economic value of the animal as against the vegetable class. It shows also why eating too abundantly of animal food is followed by conditions of suboxidation, especially if there is lowering in the oxygenating capacity. At the

same time it has been proved conclusively that neither class is absolutely perfect in all respects for general use during the whole period of human life, that is, if the aim be to secure the highest results both mentally and physically. While it is true that some animals are so constructed that they can handle to better advantage vegetable foods than is the case with other species, it is not true that man can digest vegetable food easier than the animal class. Therefore, between these two extremes there will naturally be found two other forms of dietaries, one which deserves to be classified as a well regulated or ideal mixed diet, the other an imperfectly regulated diet, in which the vegetable and animal class are less perfectly adjusted. (See diet table).

FOR AN ABSOLUTELY RESTRICTED DIET.

Buttermilk, skimmed milk, or milk, or some of the fermented milks (kumyss, zoolak, kefir, sumal). Beef tea, bouillon, and plain mutton, chicken, clam or oyster broth.

AN IDEAL MIXED DIET.

For Breakfast. Two eggs, eight ounces of milk, two ounces of wheat bread and butter.

For the Mid-day Meal. From one-quarter to one-half pound of beefsteak, eight ounces of milk, three ounces of wheat bread and butter.

For the Night Meal. From one-quarter to one-half pound of beefsteak, eight ounces of milk, two ounces of bread and butter.

At Bed Time. Eight ounces of milk.

Beefsteak is taken as the working standard among the meats, as it is the most easily digested of all food stuffs. Under the heading of meat is included lamb, mutton, occasionally veal; all kinds of fish, including the shell forms, such as oysters, clams, lobsters, and crabs; poultry and game of all kinds.

The meats to be broiled, boiled or baked.

The fish to be boiled or baked.

The oysters and clams to be eaten raw or stewed. The lobsters plain boiled.

A little crisp bacon may be taken from time to time, also ham and corned beef, WITHOUT CABBAGE.

Eggs may be taken boiled, poached or scrambled.

The milk is best taken warm or with a little lime-water added.

Wheat bread is taken as the standard because it is the most easily and perfectly digested. It should be at least twenty-four hours old or toasted; rye, graham, zwiebach, or the health food breads may at times be substituted.

Weak coffee, without milk or sugar, or with a dash of milk, may be taken freely as a beverage. Coffee taken clear aids digestion, but with milk and sugar often disturbs digestion.

ADDITIONS TO ENLARGE THE ABOVE DIET.

In the line of vegetables: string beans, green peas, lima beans, spinach, lettuce, asparagus, and cauliflower. These are chosen because they are the least likely to excite intestinal fermentation of an abnormal character. They should be well cooked, and only one vegetable at a meal.

When a vegetable is taken with the meal there must be a reduction in the quantity of meat or milk as given in the above table.

To the above may be added boiled rice and macaroni, and occasionally boiled beets.

FOOD STUFFS TO BE AVOIDED.

All fruits, either cooked or raw; all cereals and breakfast foods, nuts, sweets and pastry of all kinds, potatoes in all forms, onions, tomatoes, turnips, parsnips, carrots, celery, radishes, cabbage, egg- and oyster-plant, corn, etc.; pork in all forms, except as before stated. Rich gravies, and all forms of soup are excluded. The latter, first, because they tend to destroy the keen appetite which makes possible the eating of plain and substantial food; second, because they destroy the appetite and stimulate a strong desire for the entrements and highly seasoned foods; and, third, because the mixed, cream and rich stock soups tend to excite undue and putrefactive fermentation in the intestine. Rich gravies, because they disturb digestion.

Potatoes, that are so commonly used, are excluded for three reasons: first, because they have a high percentage of starch and a low percentage of proteid; second, because they are so apt to be taken three times daily, and are so often eaten fried; third and

chiefly, because of the ease with which the starch contained in the potato is digested and assimilated within the system. In consequence of this rapid utilization of the potato starch, which yields to the animal economy only heat, the oxygenating capacity of the system is exceeded, and there is not a sufficient amount of oxygen left within the body to perfectly oxidize and assimilate the proteid constituents of the food that must be accomplished if a perfect state of health is to be maintained. In the repair of the diseased conditions it is still more necessary that the proteids shall be perfectly oxidized and assimilated, hence the absolute necessity to exclude the potatoes and food products enumerated.

Fruits are excluded, first, because they are usually picked before they are fully ripe; second, because they are in a state of partial putrefaction, and are often covered with bacterial life when eaten, and often taken in excessive quantities. Having reached the alimentary canal in this state, they excite undue and putrefactive fermentation of proteid constituents contained within the intestinal canal and thus prevent the perfect digestion and assimilation of the proteid elements of the food.

When these rules are followed a good variety in the dietary can be secured, and a high grade of nutrition established and maintained. Disregard of these rules will sooner or later result in disease of one kind or another.

The close adherence to these rules, with suitable medication, will result in the cure of many a diseased process, which other-

wise will make life miserable and ultimately cause an untimely death.

The ideal mixed diet of the author is so adjusted that it contains the requisite percentage of the five classes supplied in the most easily digestible and assimilable form possible. It furnishes the requisite amount of heat production equally distributed between the hepatic and pulmonary circuits to bring about a harmonious and automatic balance of action between innervation and inhibition of all parts of the body, thus producing perfect physiologic action in this respect; it supplies the requisite amount of pure proteid material for tissue construction and regeneration; it supplies the full amount of hemoglobin- and lecithin-yielding material, all of which is fully accomplished well within the oxygenating capacity of the system. This form of diet is best secured by preponderance of the animal class and by keeping the vegetable class well in the minor quantity. The less perfect mixed diet is one in which the reverse is true. This latter form is often spoken of as a vegetarian diet, implying thereby that vegetables only are eaten; but a truly vegetable diet must exclude absolutely all animal foods, even in the process of cooking. In like manner, the animal diet must absolutely exclude all substances of a vegetable nature. It is the loose manner

in which these terms are used that has led to much error in the discussion of this very important subject, and hence many of the deductions have been erroneous.

From the foregoing it is but just to argue that a well regulated or ideal mixed diet must yield the highest grade of nutritive activity, both in health or disease, be the latter either acute or chronic.

In connection with the acutely infectious and highly toxic processes still another subdivision of the results that can be obtained from the foods utilized will make the elucidation of dietetic treatment still more simple and easily workable. As for instance a division into two classes, heat producers and nourishing furnishers. Or we may speak of them as those having a high caloric value and low proteid value, or vegetable class. Or those having a high proteid and a low caloric value, which is characteristic of the animal class.

With this fundamental knowledge of dietetics we are in a position to secure the most valuable diet in the treatment of pneumonia or any other disease.

In pneumonia the first thing to be considered and overcome from a dietetic standpoint is the lowered nutritive activity prior to, during the development and progress of the acute process. Later on the convalescent stage must be considered.

In all conditions where there is a general lowering of the nutritive processes, the natural call is for a higher supply and utilization of the proteid elements, with the development of a sufficient heat production to yield the caloric energy required to utilize the proteids, and maintain the various activities of the system. Such a result is best accomplished by a slight enlargement of the ideal mixed diet already given. Just at this point, however, we are confronted by a decided inability of the digestive system to perform even the normal amount of work. To which must also be added a lowering in the oxygenating capacity of the system due to a blocking out of a part of the air space by the pulmonary inflammation. Therefore, such a diet cannot be instituted, and we are forced to fall back upon a very limited diet and one wholly liquid in character, composed of milk, eggs, and broths of various kinds. The milk can be used, plain, predigested, or variously fermented as the exigencies of the digestive system demand. These should be administered in small quantities at short intervals, but in as large amount per day as the digestive system can perfectly handle. Great pains must be taken not to exceed or overtax the enfeebled digestive powers, for a little food well digested is far more valuable and less

detrimental to the system than larger amounts imperfectly transmuted at the same time. The main object throughout the whole course of the disease is to raise the intake and utilization of proteid material as nearly up to or a little beyond the normal standard as possible. A diet of this composition naturally has a low caloric value, hence the absolute necessity for the use of some alcoholic preparations as heat producing food substitute.

Under conditions of this kind alcohol becomes a very valuable substitute food, because it can often be taken up and oxidized in the epithelial cells of the alimentary tract without the expenditure of any digestive energy. When this is the case, it yields directly, but in an artificial manner, the heat energy which must be supplied to the system if life is to be maintained during the progress of the infectious process, or until nature can throw off the damaging effects of the toxemia. To secure the best results the alcoholic food must be given at short intervals and in such quantities as will make good the loss of caloric value from the normal food products.

This accomplished we have secured the highest grade of nutritive activity compatible with the abnormal conditions of the system. In some instances, even under

these theoretically perfect dietetic conditions the patient is progressively growing worse. This is explained by the fact that this highly proteid diet of the animal class, permits an undue amount of putrefactive fermentation in the alimentary canal. At the same time it often supplies the system with so much active proteid material that the culture medium in which the bacteria thrive is augmented and their growth and toxic activity is intensified. This is evidenced by the higher temperature and greater restlessness. Changing the diet to one composed largely of the vegetable class, as the meal gruels, and vegetable broths, at once lowers putrefactive activity in the intestinal canal. It also greatly reduces the protein supply to the system and augments its caloric value. This has a decided tendency to decrease the richness of the culture medium in which the bacteria thrive, lessens bacterial activity and the toxicity of the system and by the heat energy obtained through the oxidation of the starches and sugars augments glandular activity. Thus by shifting from a food of high nutritive and low caloric value to one of an opposite nature the desired results can be attained from diet alone. By this it is not to be inferred that alcoholic preparations as food are to be ignored. Neither does it exclude medication in the management of

these cases of inflammations of the pulmonary organs.

The main object of this paper has been to call attention to the methods by which diet alone can be made to modify pathological processes, and to point out the differences in the condition of the patient that may call for a change in the composition of the diet.

Owing to the greater ease of digestion and the higher nutritive value of the animal class, this class is more frequently called into service than is the vegetable class alone. Owing to the lower nutritive, and higher caloric value, and antebacterial influence, the vegetable class can often be utilized to great advantage. Great skill must be exercised, however, in changing from one class to the other lest nutritive activity be allowed to fall to too low an ebb, and the heart muscle be starved to death.

Having passed the critical point and reached the stage of convalescence, the diet must be brought back as rapidly as possible to a soft, or semi-solid diet. The latter to include cooked eggs, soft toast, and the lighter meats, until finally the well regulated and ideal mixed diet is again fully established. A diet which will furnish the full quota of constructive material, the requisite heat production rightly proportioned between the proteids, fats,

starches and sugars. This accomplished a perfectly normal state of the physiological economy must follow, assuming that the system can perfectly utilize the same.

PNEUMONIA AS A POST-OPERATIVE COMPLICATION.

BY

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We older surgeons all remember when erysipelas, pyemia and tetanus were common complications, darkening the path of the surgeon.

When aseptic surgery gave us a lighter path, we concentrated our fears upon the subject of shock. The subject of shock was studied, understood, managed. Having cleared the way so far, we began to note a post-operative complication standing out prominently, for the reason that it had been previously obscured by the abundance of other accidents. This complication was post-operative pneumonia. There are few complications after surgical operations which take the surgeon off his guard, or bring disappointment, more distinctly than pneumonia. It is apt to appear quite unexpectedly at a time when the patient may be starting off well after a properly con-

ducted operation, and always introduces an element of anxiety.

The surgeon who reduces his death rate one per cent. year after year is now acutely interested in this last frequent complication which is to be eliminated in large part by his efforts. That it is a matter largely within his power is indicated by the steadily decreasing proportion of post-operative pneumonia cases, due incidentally to our refinement in operative technic, although the cause and effect relationship between pneumonia and such technic is not always kept in mind for purposes of report.

It is somewhat difficult to get statistics showing the proportion of post-operative pneumonia cases, because authors are apt to make separate classification of end results, under a nomenclature which does not lead us to remember that these cases belong among the pneumonias at some stage. For instance, Biberzeil reports somewhat over three per cent. of pneumonias after 3,909 operations of various kinds. Of these pneumonias, 10 were lobar, 98 lobular and 27 hypostatic. He did not include among the pneumonias, cases of larger embolism and abscess, but grouped them along with the pleurisies and empyemas. Albanus found two per cent. of pulmonary embolism after laparotomy in 1,140 cases. Most of these cases would belong to my simpler

classification of lobular pneumonia. American authors have been especially prone to bring in confusion, by classifying post-operative pneumonias as "ether pneumonia, pulmonary embolism and infarction, pulmonary abscess, pulmonary gangrene," and so on. Czerny reports four per cent. of post-operative pneumonia in 1,300 laparotomies, while Trendelenburg finds five per cent. Henle divides 48 cases of post-operative pneumonia into 7 acute lobar, 24 of bronchial pneumonia and 17 of gangrene. Kuemmell found 29 pneumonias after 1,070 laparotomies, of which 8 were lobar and 21 lobular.

It will be seen that the classification by Kuemmell placing lung complications under two kinds of pneumonia simplifies matters very much, but I would add hypostatic pneumonias to the group.

While the pneumococcus is the pathogenic bacterium in lobar pneumonia, we may find it present in the lobular pneumonias also, but not as the dominant species. Friedlander's bacillus, streptococci, and colon bacilli are commonly dominant species in lobular pneumonia. Lobar pneumonia appears so shortly after operation in some statistics that it leads to the suspicion that operation has sometimes been done for some abdominal condition where the surgeon was led astray by the early

abdominal symptoms of pneumonia. These sometimes appear in advance of classical later symptoms, and we must be on guard against including such cases of pneumonia in the post-operative group. Symptoms referable to the appendix region as an early symptom of lobar pneumonia, are common, and I once operated in such a case, and have heard of many other cases subjected to operation at this stage. Personally I have been trapped but once so far as operation was concerned, but since that time have seen a number of lobar pneumonia cases in which one might readily believe that some abdominal condition was calling for immediate surgical attention. Cases of incipient lobar pneumonia with abdominal symptoms, can now be differentiated from appendix cases I think, by the testimony offered by hypersensitiveness or absence of hypersensitiveness on deep pressure at the site of the right group of lumbar ganglia.

Lobular pneumonia usually comes on so much later after operation than lobar pneumonia, that it is frequently overlooked in its early insidious stages.

It is the conviction of some authors that true lobar pneumonia, occurring after operation, is merely a coincidence. While it is relatively infrequent, it occurs too often to allow me to believe that some of the cases

are not dependent upon the operation, and for a reason which I shall state in connection with notes on lobular pneumonia.

Hypostatic pneumonia we may dispose of in a very few words in this particular article, because we know so well when to anticipate its occurrence, and the factors which contribute toward its development are not open to much question.

Lobular pneumonia is the form of pneumonia which we see most often after surgical operations, and this is the particular form usually carried in mind when the term "pneumonia" without qualification is used.

The predisposing factor which to my mind stands first among the causes for both lobar and lobular pneumonia after operation, is not the one which is found described by authors. My idea is that the lowering of the patient's general resistance by unnecessarily prolonged or severe operations, and undue length of time expended under an anaesthetic, take first rank among predisposing causes. When aseptic surgery allowed us to move rapidly ahead in operative work, we were not aware of the moment when we passed the pivotal point, and met the law of diminishing returns. We met the law of diminishing returns, when, feeling safe in our principles of aseptic surgery, we deliberately expended

more time than was necessary in order to make ideal completion of operations. Let us stop a moment to think about this. We assume that the pneumococcus of lobar pneumonia and the varied bacteria of lobular pneumonia are practically omnipresent, and ready to form active colonies at any time when conditions are right. Anything which lowers the resistance of the individual to infections in general will lessen his resistance to these bacteria in particular. Cantacuzene showed us that guinea pigs subjected to the influence of alcohol or opium, quickly perished from infections which at the same time were resisted by another lot of guinea pigs, which were not under the influence of these drugs. Ether is closely related to alcohol, and we may infer that it temporarily lessens the resistance of patients to infections which may begin in an hour under favorable circumstances. Prolonged operations, and operations with long incisions and much handling of viscera, lower the resistance of the patient for the moment, and through the influence of shock may prevent him from carrying on the normal physiologic process of manufacturing phagocytes and antibodies sufficient for meeting infection subsequent to operation. The deduction which I make is this, if we operate as expeditiously as possible, and reduce hour operations to

fifteen minute operations when that can be done without jeopardizing any of the patient's interests, we shall have much less post-operative pneumonia of any sort to deal with. This has certainly been my personal experience.

Authorities are inclined to place age in first position as a factor predisposing to pneumonia subsequent to operation, and I will not ask the profession to accept promptly the factors which I have placed first. Pneumonia appears after abdominal operations more often than after any other one class, and Kelling has shown that a man seventy years of age is nearly five times as prone to develop pneumonia after laparotomy, as a man between the ages of twenty and forty. This is quite in line with my theory of lessened resistance standing first however.

Kelling states that men are more predisposed than women to this complication, because of the relationship between pneumonia and alcoholism, arteriosclerosis, cardiac weakness, persistent bronchitis and emphysema, and sexual differences in type of respiration.

Authors have had much to say about the influence of narcosis upon the production of post-operative pneumonia, but this complication has been reported as occurring after operations done under local anaesthesia

so frequently as to bring again under consideration my belief about the influence of lessening resistance temporarily by any major operation whatsoever. It is quite true that general anaesthetics are all more or less irritating to the bronchial mucosa, and patients who have bronchitis at the time of operation are especially disturbed by ether. To meet this seemingly added danger, however, we have the fact of protective local hyperleucytosis. It has already been called out by the presence of an established bronchitis.

Post-operative vomiting we know to be a factor in the production of pneumonia, because mucus, or more irritating substances, are often aspirated by the patient.

Deep aspiration of fresh bronchial secretion is often a factor.

While the more volatile anaesthetics have a greater refrigerating effect upon the mucosa of the bronchi, it might be a question if the temporary congestion such refrigeration causes might not furnish protection in line with the theory of Bier, unless bronchitis progresses later.

Where pain after operation limits the full range of the muscles of respiration, pulmonary stasis is favored, and varied forms of pneumonia may result.

Local congestion of the lower lobe of the right lung with more frequent occurrence

of the development of pneumonia on the right side, may be due to the weight of the liver of the patient in a recumbent position.

Patients whose general resistance is lowered by alcohol or other drugs, or by such a disease as cancer, are particularly apt to develop pneumonia after operation, and this again is in support of my idea of the prime factors.

Direct infection of the lungs by the varied bacteria may occur in three channels; by way of the mucous membrane, the blood vessels, and the lymph vessels. It is not necessary for the mucus from the bronchi to be infected in order to be dangerous, for recently-formed sterile mucus aspirated into small tubules may cause atelectasis of lobules, and that part of the lung then becomes less resistant to infection arriving by way of the lymph and blood vessels.

One reason why pneumonia follows abdominal operations more often than in any other class, is because of the tendency to pulmonary stasis and retention of matters which would be expectorated, were expectoration not so painful. After abdominal operations there is also a tendency to more vomiting, with resultant aspiration of fluids, because we disturb the great vasomotor centers profoundly by almost any sort of work within the peritoneal cavity.

Jonnesco believes from his statistics that

spinal anaesthesia according to his method, distinctly lessens the tendency to aspiration pneumonia, because the conscious patient guards his larynx beside avoiding excessive bronchial secretion due to anaesthetics. This feature of spinal anaesthesia is one to which we may properly give serious consideration.

Embolic pneumonia by infection from the blood stream is perhaps more common than is generally supposed, and in this connection I wish to present an additional theory to account for the frequency of pneumonia after abdominal operations. Experiments made with Petri plates in the operating room show that vast quantities of bacteria are being carried into the peritoneal cavity every moment that it is exposed. We know that the peritoneum may almost rival the skin in its ability to resist infection, and yet these bacteria entering the open peritoneal cavity must be disposed of somewhere.

Most of them, no doubt, are destroyed in the customary way by the body cells of the patient, and yet I cannot but feel that many of them are carried quickly to the lungs. If these lungs have been rendered non-resistant by the effects of the anaesthetic, shock of the operation, and the mechanical features resulting in stasis after operation, the patient may have pneumo-

nia, which we did not fear, in place of the peritonitis which the older authors at least would have feared. One does not realize how many bacteria fall into an open peritoneal cavity, unless he is familiar with the culture experiments made in the air of the operating room, and he does not realize how little harm bacteria may do in the peritoneal cavity unless he remembers the work of Tait. In order to have the smallest number of air bacteria in the peritoneal cavity, however, we ought to work as rapidly as possible, in order to avoid the action of bacteria which rarely cause peritonitis, but which may frequently cause pneumonia. This is a theoretical statement only, but I am personally so well convinced of the possibilities of these bacteria for distant harm, that it forms one of my reasons for doing the most expeditious work possible without sacrificing the patient's interest, whenever the peritoneal cavity is opened, and exposed to the air bacteria which are certain to float in.

It is a question if we have at the present time sufficient knowledge to allow us to discriminate nicely between aspiration pneumonias, pneumonias due to general loss of resistance, and pneumonias from minute embolic colonies of bacteria, although we can distinguish certain types of embolic pneumonia where the emboli are large.

Embolic pneumonias have been for some time recognized as belonging to the class of cases in which we have infection in the peritoneal cavity already established at the time of operation, and they are particularly apt to follow acute infections with exacerbation following operation. This is probably due to the escape of emboli before the veins have had time to protect themselves well with fixed thrombi.

Among the predisposing causes to pneumonia, a good deal has been said about exposure of the patient to cold during the time of operation, and some surgeons have made a point of warming the operating table, and asking the nurses to be particularly watchful in guarding the patient against undue exposure. This is highly commendable on general principles, for when we have rendered the patient helpless for a period we assume a responsibility in more ways than one, but it is my personal belief that the patient under an anaesthetic is quite as irresponsive to the influence of cold as he is to the knife. Patients while coming out from under an anaesthetic, however, may throw off the bed clothes while their underclothing is moist with perspiration; and at this period the danger from exposure to cold is no doubt real.

A form of pneumonia commonly called pleuro-pneumonia frequently follows opera-

tions upon the liver and gall-bladder when infection is present at the time of operation. It is probable that infection is transmitted by way of the lymphatics through the diaphragm to the pleura, and the neighboring lung is engaged in an infection which may develop into pneumonia of the lobular type, but which I more often classify among the consolidations occurring by transmitted infection, and not belonging properly to the pneumonias.

In relation to the question of prophylaxis, this article has already stated what I believe to be the most important points, but there are other measures for prophylaxis against post-operative pneumonia which may be brought to bear. We frequently have cases in which it would be advisable to postpone operation until the patient could be gotten into a better state of general resistance through medical treatment in advance of operation. For instance, if the patient were to have an acute tonsillitis at the time set for operation, it would be advisable, other things being equal, to postpone the operation until danger from aspiration of very active colonies of bacteria had been lessened. Fowler's position has been advocated as lessening the danger from post-operative pneumonia after abdominal operations, and probably on a good basis of reasoning. The matter of keep-

ing the patient upon the left side as much as possible after an operation, would seem to have the tendency to lessen the right-side stasis of the lung which is actually shown by statistics to be a common starting point for pneumonia.

The work of the physician and surgeon is so closely related in this question of post-operative pneumonia that he is a fortunate surgeon indeed whose medical training has been sufficient to teach him whom to call in consultation; and it is a fortunate physician who has had enough surgical training to know at what time a surgical operation may best be performed.

There is no particular treatment for post-operative pneumonia that I would wish to present. I do not look after this part of the case myself, but leave the treatment to internists on the hospital staff, or to the family physician in private practice, all of whom have so many ways of rendering service that I have not detected any special principles which might be formulated.

The matter resolves itself into the general proposition that post-operative pneumonia will occur much less often at the hands of physicians and surgeons who comprehend the whole subject, than at the hands of surgeons who have in mind nothing beyond the necessity for doing some operation which seems to be required from

a purely surgical point of view. "The simple operation" is something which is seldom referred to as such by any surgeon who has been long in the field of practice.

PNEUMONIA IN THE AGED.

BY

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Probably no disease associated with senility gives rise to a greater number of surprises than pneumonia. Many a man who appeared in his usual state of health, save perhaps that he complained of lassitude, has gone to bed without medical attention and in the morning has been found dead. Post mortem examination has frequently revealed a pneumonia entirely unsuspected.

The reason is not far to seek. In the first place, among the peculiarities of pneumonia in the aged are its insidious onset, the frequency of pneumonias showing only a slight rise of temperature, and even pneumonias that have subnormal temperature throughout their entire course. The rapidly fatal results are of easy explanation. The arterio-sclerosis, the fibro-myocarditis,

the interstitial degenerations of the kidneys, taken in conjunction with impaired nutrition give a ready explanation for its great fatality. And, granted, that the patient survives, the marked peculiarity at this point lies in the fact that the pneumonia has not the tendency to recover as in the young adult, but to extension and this extension is probably due to an obliteration of the lymphatics so that the exudate is absorbed with difficulty, and as a result we have forms of inflammation that result occasionally in abscess and gangrene. The classical chill is very frequently absent, the reason being that on account of the lowered vitality, the insult of bacterial invasion does not give rise to reaction. And thus patients who come under the care of a physician frequently complain of little beyond malaise, or perhaps mental depression. At other times, a disturbance which the patient readily attributes to disturbed digestion resulting from unusual or improper food, is the only complaint. Rarely indeed are the symptoms of abdominal distress so great and the localization in the lower right quadrant so pronounced that appendicitis has been considered, and it is not unheard of that the symptoms have been misinterpreted and the abdomen opened only to find the appendix in an atrophic condition so common in old age.

Or a profuse diarrhoea may be almost the only symptom when the morrow demonstrates the existence of an extensive pneumonia.

The pneumonias of the aged are far more markedly septic than in early adult life, and not only that, the proportion of basal pneumonias, which are septic, is beyond what we expect. Granted that the diagnosis has been established, in determining the seat of the pneumonia, the observations of Hourman and Deschambre, first published in 1835, should be borne in mind. The first type of the senile lung they describe as follows: "In muscular persons with a well formed thorax, not much altered by the ravages of age, the lungs present little apparent difference from those of the adult except in the altered position of the great interlobular fissure. The degree of this alteration corresponds with the extent of lateral flattening resulting in diminution of the transverse diameter of the chest. In the adult this fissure lies immediately beneath the upper lobe and passes obliquely to the right of the lungs so that on the right side the central lobe occupies exactly the middle part, and in the left side has the lower lobe immediately beneath it (the fissure). But in the aged the fissure approximates to a vertical direction so that one lobe in the left will be directly in front

and the other behind, and the middle lobe in the right lung projects downward and the lower lobe becomes elevated behind so as to form the posterior four inches (or more) of the summit of the organ."

The significance of this condition lies in the fact that a pneumonia which may be entirely at the apex so far as its position is concerned may really be situated in the lower lobe of either lung. Further, the calcification of the costal cartilages, the weakness of the auxiliary muscles of respiration render expectoration a difficult problem.

Then so far as the lung condition itself is concerned, the atrophy of the constituent elements of the tissues, the progressive infiltration into certain tissues of organic, either fatty or albuminous, material or mineral (calcareous) elements foreign to their normal condition, and the exaggerated production of connective tissue result in a lung in which the circulation is sluggish. Then added to this we have fatty degeneration of the alveolar walls resulting in perforation, the capillary blood vessels being thus deprived of their nourishment, atrophy, and the blood supply, is diminished in its fibrous tissue. As a result sclerosis is common, so that the problem in senile pneumonia is one of an acute infectious disease in tissues already the site of degenerations and

atrophies. And when this occurs, as it does in a person whose general vitality is lowered, a high death rate is to be expected.

Expectoration as a rule is scanty but characteristic. When expectoration is profuse, it is usually in those subjects who have previously suffered from a senile bronchorrhœa or bronchitis and is not characteristic in color or consistency.

The problem which the physician has to deal with is, first, to carry the patient through the shock of infection, and a patient so enfeebled that none of the defensive mechanism of the organism is likely to be brought into play.

To stimulate the heart there is probably no better remedy than ammonium carbonate in five or ten grain doses, each dose administered in two ounces of milk every two to three hours. In this way the patient can be carried through the few days before the ammonium disturbs the stomach.

At longer intervals, strychnine either the sulphate or nitrate in unusual doses, say 1/20 gr., preferably given hypodermatically, every three hours, may mean recovery of the patient where less vigorous stimulation would yield a fatal result.

The patient is not likely to develop any defence against his bacterial invasion, therefore an artificial aid at once becomes neces-

sary. That is found in creosote carbonate 30 minim doses every two or three hours, which is safe up to the period when resolution takes place. Ordinary creosote should not be given to the aged on account of the facility with which it produces irritation of the kidneys, even resulting in epithelial and blood casts and free blood.

The diet must be nutritious and in small amounts, for with the already over-taxed heart and the possibility of gastric irritation from the ammonium carbonate, albumins are best chosen. These must be ones easily digested in the stomach or predigested of which several varieties can be found in the market. Or egg albumin artificially digested up to six to eight ounces in the twenty-four hours. A large quantity of liquid is inadvisable. First, on account of the heart; and, second, on account of the distension of the stomach causing embarrassment. The quantity of milk taken is limited to that which is necessary in the administration of ammonium carbonate. The creosote treatment will obviate tympanites, which in the aged proves a most embarrassing complication.

The bowels are best moved by a concentrated enema of two ounces of magnesium sulphate dissolved in two ounces of boiling water which is allowed to cool and an ounce of glycerine added. This should be ad-

ministered through a rectal tube at least eight inches into the bowel.

The room should be kept at a moderate temperature, the air carefully changed and kept dry, not the dry dusty air of a furnace heated room, but preferably an open fire. In case the weather is rainy or the atmosphere damp, a saucer containing strong sulphuric acid or a few ounces of exposed calcium chloride will dry the air sufficiently.

External applications as poultices are usually troublesome, and the results indifferent.

The temperature should be carefully watched. If following subnormal or a slightly elevated temperature there occurs a marked rise, a metapneumonic pleurisy should be suspected. If later the temperature becomes irregular, pulmonary abscess or even gangrene should be borne in mind.

Most of the pneumonias of the aged are practically free from pain, but if pain be noted, opium and all of its alkalies except one, codeine, should be avoided.

Expectorants in pneumonias of the aged are usually not required and theoretically are objectionable, inasmuch as most of the pneumonias of the aged come to an end through absorption rather than expectoration, the crisis is not looked for, but rather a steady lysis.

In a word, any unusual symptoms in the aged call for thorough investigation and most careful physical examination. Having determined the pneumonia, active stimulation, careful feeding, vigilance during the protracted period of convalescence and above all the avoidance of depressants and the absolute prohibition of opium in all its forms save the one exception noted above.

679 Madison Ave., New York.

MENINGITIS COMPLICATING PNEUMONIA, WITH A REPORT OF CASES.[1]

BY

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Pneumonia, with cerebral symptoms, is quite common in children, particularly in the beginning of the disease, formerly it was thought that meningeal symptoms were associated with apical pneumonia only. This has been denied by careful observers. It is not likely that the initial cerebral symptoms are due to the effect of pneumococci, or their toxins on the central nervous system; because the cerebral symptoms are only introductory and in the majority of cases disappear with the appearance of distinct pulmonary symptoms.

They may perhaps be attributed to the rapid rise and continued high temperature which causes a hyperaemia of the brain. Convulsions, also, may develop in this manner, in cases of special predisposition, as it is common in neurotic families.

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[1]Read at a meeting of the Eastern Med. Soc.

Fraenkel's diplococcus is not the cause of croupous pneumonia only, but may at times travel to other regions and cause pleurisy, pericarditis, endocarditis, peritonitis and nephritis. It invades also the joints, middle ear, or the parotids and lastly the meninges.

The following cases are very interesting:

CASE I. Eleven months old. Suddenly became ill with a severe attack of pneumonia and marked nervous symptoms. Made a complete recovery on the tenth day. Had a relapse on the eleventh day with high temperature, frequent respiration, unconsciousness, restlessness, an upward rolling of the eyes, and rigidity of the neck, back and extremities.

Symptoms persisted until admission to Beth Israel Hospital on the 16th day of disease which was June 5th, 1908. Child then came under the personal observation of Dr. Hymanson and was in a marked prostration with distinct symptoms of lobar pneumonia at the right upper lobe, anteriorly and posteriorly. T. 104, P. 140, R. 52. Ears and mastoids were negative, pupils reacted sluggishly to light, there were no changes in the fundus of the eyes. Reflexes were exaggerated. There was marked rigidity of the neck, and the entire voluntary muscular system was in a state of spasm.

A lumbar puncture was made on the following day, and 4 c.c. of turbid fluid under tension was obtained, in which distinct pneumococci were demonstrated. The pneumonia and meningeal symptoms persisted for the next three days and on the fourth day, clonic convulsions at regular

intervals began and lasted until the following morning. They were more marked on the left side of the body. The child did not respond to any treatment, gradually sank, and died on the 23rd day of her illness. No autopsy was obtained.

CASE II. Fr. T., 18 months old, was admitted to the hospital on June 18, 1909. The family and personal histories were negative. The present illness began four days before admission, with fever, vomiting and anorexia. There were marked nervous symptoms, staring of the eyes, strabismus and listlessness. On the evening before admission, the child had spasm of the lower jaw and feeding became an impossibility. On the following morning, he had a severe attack of convulsions which was more marked on the right side.

On July 19th, the condition of the child was very poor, there was marked dyspnea and cyanosis. The temperature during the day was ranging from 101 to 103.5 F., pulse, 160; and respiration 60. The fontanelles were bulging; the pupils were dilated and reacted to light. Ears, nose and throat showed no abnormalities. There was a distinct lobar pneumonia, at the right upper lobe, mostly marked at the apex. The liver and spleen were somewhat enlarged. There was marked tache present. The child had clonic convulsions on the side, the face, and the upper and lower extremities.

A lumbar puncture was made and 10 c.c. of thick pus was obtained. The fluid was examined by the pathologist of the Beth Israel Hospital, Dr. Eli Moschcowitz, and diplococcus pneumonia was found. The child vomited several times during the day, he was unable to swallow and had to be

fed by gavage. He had twitchings and occasional rigidity of the entire body, and there was stiffness of the neck. The hands and feet became cyanosed; the pulse was not perceptible, and the child died on the evening of the sixth day of his illness.

CASE III. Child, D. B., two years and six months old, was admitted July 8, 1908. He was well until seven days before admission when he became ill with fever, vomiting, and dyspnea, later, he became extremely apathetic.

On July 9th, the cheeks were flushed, there was herpes labialis present. The eyes, nose and ears were negative. The submaxillary, axillary, and inguinal glands were enlarged. Posteriorly, there were signs of complete consolidation of the right, middle and lower lobes. The reflexes were normal. T. 103.5; P., 140; R., 50.

On July 10th, the child's body became rigid, at times he was very restless, also dull and drowsy. He took very little nourishment. During the next five days, his nervous condition became worse, there was extreme apathy, a general rigidity of the entire body and at times twitchings of the extremities. Anorexia was marked, he coughed frequently, vomited a number of times, and screamed sharply during sleep.

The urine was normal. Ophthalmic reaction with tuberculin and Von Pirquet test were negative. Blood count showed 3,500,000 red corpuscles; haemoglobin 70%; 15,000 white blood corpuscles; small mononuclear, 20%; large mononuclear, 6%; polynuclear neutrophile, 70%; eosinophile myelocytus, 1%.

During six days, three lumbar punctures were made and altogether about 30 c.c. of

slightly cloudy fluid was obtained under pressure. In the last two specimens, Dr. Hertz, bacteriologist to the hospital, found distinct Friedlander's bacilli.

On July 18th, the temperature was ranging between 102 and 105 F.; pulse, 150; and respiration, 70-80. The child had nine convulsive attacks, each lasting from 3 to 7 minutes, which were controlled by chloroform, only. During the afternoon, the body became rigid, the eyes were rolled upward, and the pulse could not be counted. The child died on the seventeenth day of his illness. No autopsy was obtained.

The experience of various clinicians is well recorded in the literature of the subject. Drs. Musser and Morris in *Osler's Modern Medicine* say that among 49,028 clinical cases collected, meningitis occurred in 206 (0.24%), and on autopsy, out of 4833 cases, in 190 (3.5%).

In 1866 and 1868, Immerman and Heller from Erlangen (*Deutsches Archives fur Klin. Med. Bd. 5*) claim that they have found in autopsies made on 30 cases of pneumonia, 9 cases of suppurative meningitis. (Almost 1/3.) Hugo Meyer (from the Pathological Institute of Dorpat, 1887) found 5 cases among 11 autopsies.

Dr. Holt (*Archives of Pediatrics,* Vol. X, p. 1012, 1893) states that in 500 cases of acute pneumonia he observed only four cases complicated with meningitis. (Less than 1%).

Dr. Osler (*Modern Medicine,* Vol. 2) says he found that 8% of the fatal cases which he observed in Montreal Hospital, had this complication.

Dr. E. Aufrecht (*Nothnagel's Practice Diseases of Lungs*), claims that in 253 autopsies, he found meningitis but 7 times, besides this he has noted meningitis 3 times, a complication in pneumonia, in patients who recovered. In 1501 cases, there were but 10 cases of meningitis, (0.66%).

Dr. E. Otten (*Jahrbuch fur Kinderheilkunde,* Berlin, May, 1909, Vol. LXIX) reviews his experience in 250 cases of croupous pneumonia in children since 1897: 34 of the cases had brain symptoms during the course of the disease, such as unconsciousness, delirium, hyperaesthesia, stiff-neck, etc. Spinal puncture was made use of. Pneumococci were found in the blood of 9 of the 70 children thus examined and 5 of the 9 succumbed to the disease. Two of these children died of suppurated meningitis. (8%).

In the Children's Department of Beth Israel Hospital, Dr. Francis Huber's service, from Oct., 1907, to Oct., 1909, we have had 180 cases of lobar pneumonia, 6 of these died from meningitis complicating pneumonia. (3.3%).

Dr. G. Liebermeister of Koln (*Munschener Medizinishe Wochenschrift,* April 13, 1909) made special examinations of the spinal cord in 11 cases (ages between 41 and 72 years) and records that changes of characteristic inflammation of the meninges were found in 1/3 of the cases examined, and clinically, often no symptoms were observed. Macroscopically, no changes were seen. It was only by careful histological study that the meningitis was discovered.

Dr. Churchill (*Archives of Pediatrics,* Vol. XXIV, p. 891, 1907) claims that next in the frequency of the meningococcus as a cause of pneumonia comes pneumococcus. From all the cases of meningitis collected, he found that 10% were due to pneumococci.

A general pneumococcus infection has been demonstrated by a great number of bacteriologists. Dr. Ewing (*Osler's Modern Medicine,* 1902) gives a total of 348 cases of pneumonia, in 160 of which the pneumococcus was isolated from the blood.

In view of the facts mentioned above, it is rather surprising that more cases of meningitis complicating pneumonia in children, have not been recorded. Possibly, some of the patients who succumbed were not carefully examined for meningeal complications, as the entire attention has been as a rule directed to the lungs, and not to

the spinal cord and meninges, therefore, some important pathological and histological changes have been overlooked.

It would certainly throw more light on the subject of meningeal pneumonia, if a more thorough examination would be made of the spine, reflexes and eyes, besides the lungs. Also, special attention should be given the blood cultures and the examination of the cerebro-spinal fluid.

DISCUSSION.

Dr. Walter Lester Carr said, it seems to me Dr. Hymanson has done well to draw attention to the necessity for careful examination in the meningitis of pneumonia, as well as to point to the statistics and the difference in the methods of examination. The pneumococcus infections are to be determined by blood examinations which, unfortunately, are not generally made. It is unfortunate that meningitic infections complicating pneumonia are referred to by men who do not follow the examination and the cases carefully enough to fully determine whether meningitis is actually present or not. We should, if possible, make sure as to whether meningitis is present by a blood culture. The mortality of meningitis complicating pneumonia is considered very high.

Dr. Louis Fischer said, in cases of pneumonia complicated by meningitis, we are frequently at a loss to make a diagnosis early and I should like to second what Dr. Hymanson brought out in regard to the necessity of having a lumbar puncture when we have rigidity of the sterno-cleido-mastoid or where we have other symptoms pointing toward a complicating meningitis.

In the case Dr. Hymanson referred to in which lumbar puncture showed pneumococci and in which there was a pneumonia, I do not know whether the doctor made a blood culture,

but I think if he had, it would have been positive, that is, there would have been a pneumococcaemia.

The cases I have seen so far this winter have been uniformly bad.

One question. In reference to the case in which only four c. c. were brought out under pressure, he said the fluid was very turgid. There were only pneumococci found in the capsule?

Answer by **Dr. Hymanson.** Just pneumococci.

Dr. Fischer continuing. A case I have seen recently had a strepto-diplococcus. We received 15 c. c. and that child died within three to four days. These cases are the ones where a diagnosis if made early by lumbar puncture, will help a great deal. A lumbar puncture properly done is a trivial operation, but it must be done aseptically. The house staff with which I am connected do a lumbar puncture on every case of convulsions to relieve the pressure. They do it as soon as rigidity appears. It can be done in a few minutes and I have never seen an infection follow it.

Dr. Henry W. Berg said, I was very much interested in Dr. Hymanson's report of those two interesting cases of real meningitis complicating pneumonia. The fact which was referred to by Dr. Carr that very frequently doctors are apt to make diagnoses of meningitis when the symptoms are only meningeal and are due to the toxaemia, is due to the fear that there may be a meningitis, and knowing the fatal character of it in pneumonia, they protect their reputations by diagnosing it from the toxic symptoms.

I do not know any sure way of making the diagnosis of meningitis complicating pneumonia except by lumbar puncture. The finding of the pneumococcus if we have a case of lobar pneumonia, will of course make the diagnosis of complicating meningitis positive. The finding of streptococcus or staphylococcus will make the diagnosis positive. The finding of diplococcus of Weichselbaum makes the diagnosis extremely interesting. During epidemics I have several times found in a case which began as a pneumonia, meningitis symptoms

intervening and the lumbar puncture later showed the diplococcus of Weichselbaum. It is of much more practical importance to indicate some way by which meningeal symptoms will enable the practitioner to make the diagnosis without puncture, because while it is true that pneumonia cases of the lobar type occasionally die, and much depends on the treatment, yet it is invariably true that a case of complicating meningitis invariably dies. There are symptoms clinically by which we can differentiate and almost positively diagnose the presence of a complicating meningitis in a case of lobar pneumonia. These symptoms are chiefly paralysis of cranial nerves. If in a case of lobar pneumonia, we see a peculiar stare of the eyes with one pupil dilated and the other contracted or if there is strabismus, or the muscle supplied by the fourth nerve on one or the other side is paralyzed or if there is seventh nerve paralysis on one or the other side, or if the child does not respond readily when irritated (pneumonia cases do respond) but if the child does not respond, if the respirations have been extremely rapid and in spite of the fact that the lungs show no signs of resolution, begin to diminish, all these are reliable symptoms. Opisthotonos is absolutely unreliable. Paralysis of the cranial nerves is the most reliable symptom and the most reliable of all is paralyisis of the third nerve. Given a case of pneumonia with these complicating cranial nerve palsies, we can believe we are dealing with real meningitis and not toxins complicating pneumonia.

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